THE physical therapy REVIEW

Glossopharyngeal Breathing — ZUMWALT, ADKINS, DAIL, and AFFELDT

Functional Activity Testing: A Report of a Survey — COOK

Recovery of Power in Leg Muscles Following Poliomyelitis — PALMER and MARTZ

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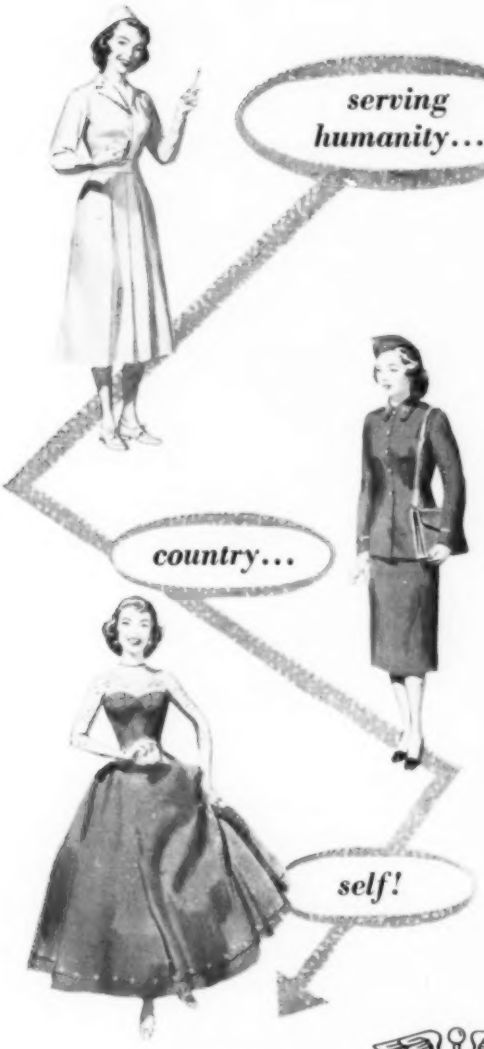

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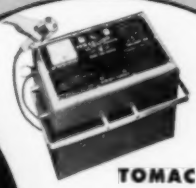

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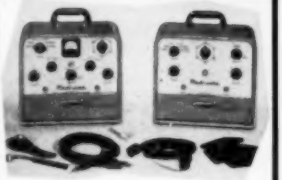

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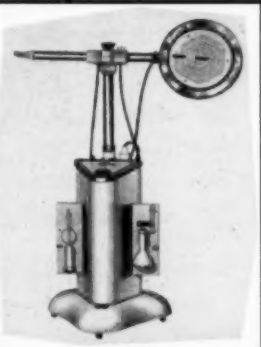

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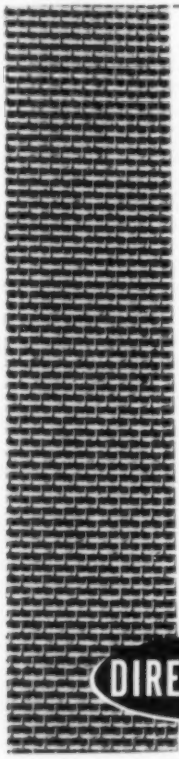

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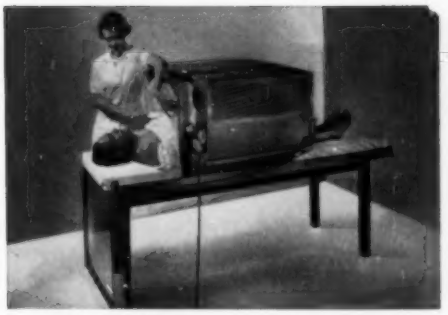

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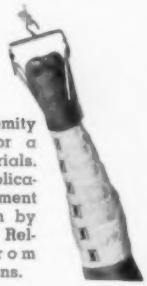

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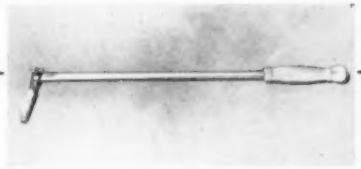

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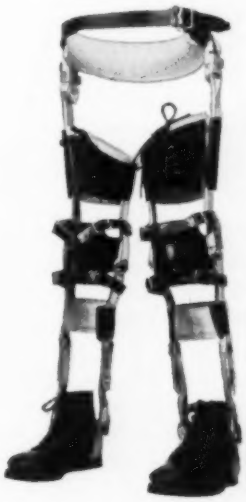

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Glossopharyngeal Breathing

Miriam Zumwalt, B.A., Hazel V. Adkins, M.A., Clarence W. Dail, M.D., and John E. Affeldt, M.D.

In September, 1952, a 17 year old high school senior in one of our western states was admitted to the hospital with a diagnosis of bulbospinal poliomyelitis. Jim was an honor student and planned to study engineering at Massachusetts Institute of Technology. After a time it became apparent that he would not be able to breathe as he had no function of the diaphragm or intercostal muscles and severe involvement of the accessory muscles of respiration. His upper extremities were completely paralyzed but he had good function of his lower extremities.

For almost two years he lived in a respirator in the hospital. Psychologically, he alternated between long periods of utter despair because his life plans were shattered, and brighter days when hope would suggest that perhaps sometime help could be found for him. The doctors in charge of Jim's care felt he would benefit from learning glossopharyngeal breathing and decided to send him to a respiratory center where he could have the opportunity to learn this type of breathing.

He was admitted to Rancho Los Amigos Hospital and began to receive instruction. It was not always easy. Some days his hopeful attitude was shadowed by the question, "What if I can't learn?" But success came at last, and soon after having mastered glossopharyngeal breathing he could be independent of respiratory equipment for 10 or 15 minutes. Next he faced the experience of being weaned from respiratory equipment. It is relatively simple to lie on the bed beside a positive pressure machine and do glossopharyngeal breathing for long periods as endurance is improved. But to be put into a wheel chair and taken away from the security of the respirator is for many patients a frightening experience. Jim's first trial was short indeed. We had reached the hall when he filled his lungs with air and said, "I think we had better go back." As soon as he was reconnected to the respirator he smiled sheepishly and said, "I think we had better try *that* again." Two weeks later he was propelling his wheel chair down the hall by using his lower extremities. After more than two years he was achieving independence and his enthusiasm mounted daily. Five months after admission he left the hospital for home and later appeared on television to tell of his accomplishments. Today he is studying again, not at M.I.T., but he will contribute his share toward the progress of science.

Glossopharyngeal breathing (GPB), sometimes referred to as "frog breathing" or "gulping," is a substitute method of breathing which can produce adequate ventilation when there is weakness or paralysis of the respiratory muscles. Air is forced into the lungs by the mouth and throat acting as a pump; therefore, the muscles of the tongue, soft palate, fauces, pharynx, and larynx must be functional.

From the Respiratory Center for Poliomyelitis, Rancho Los Amigos Hospital, Hondo, California; and the Departments of Physical Medicine and Internal Medicine, College of Medical Evangelists, Los Angeles, California.

The Respiratory Center is aided by an annual grant from the National Foundation for Infantile Paralysis.

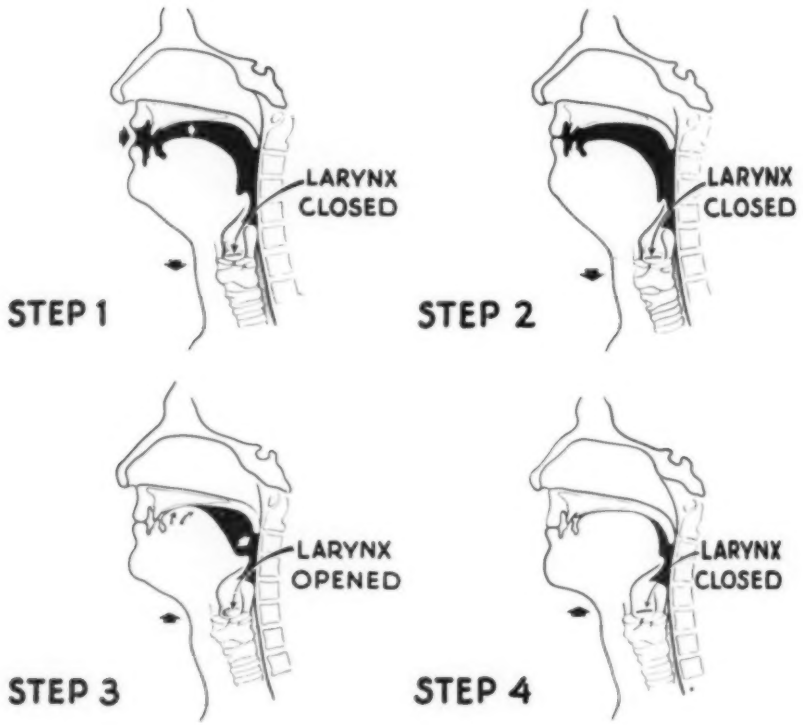

Figure 1. Mouth and throat motions in glossopharyngeal breathing. (From Dail, et al., J.A.M.A., 158: 445-449, June 11, 1955)

This technic of breathing was first observed in this institution when a patient, unaware of the process, learned to breathe in this manner. Realizing the great advantage this method might offer to other patients, we now teach it when indicated. Glossopharyngeal breathing has been studied in 200 patients by means of physical examination and, in a number of cases, by flouroscopy as well. We have also observed approximately 50 normal subjects who have mastered GPB. Self-examination, by those of us who have learned it, has proved to be of great value in understanding the mechanics involved.

Analysis of Technic

In glossopharyngeal breathing air is pumped through the larynx into the lungs by a stroke-like action of the tongue together with a constricting action of the pharynx. With each such stroke, the air accumulates step-like in the lungs. After approximately 10 strokes, the air is released from the lungs by relaxation similar to ordinary passive expiration. Each stroke can be considered a cycle. Figure 1 illustrates the motions used.

In the *first step*, a mouth and throat full of air is taken by depressing the tongue and floor of the mouth. The width of the pharyngeal space is increased and the laryngeal orifice is kept closed.

During the *second step* the lips are closed, and the soft palate is raised to trap the air in the pharynx. In *step three* the larynx is opened, the floor of the mouth is raised and the pharynx is constricted. This action, along with a progressive backward motion of the tongue forces air through the opened larynx into the trachea. The cycle is completed in *step four* when the larynx

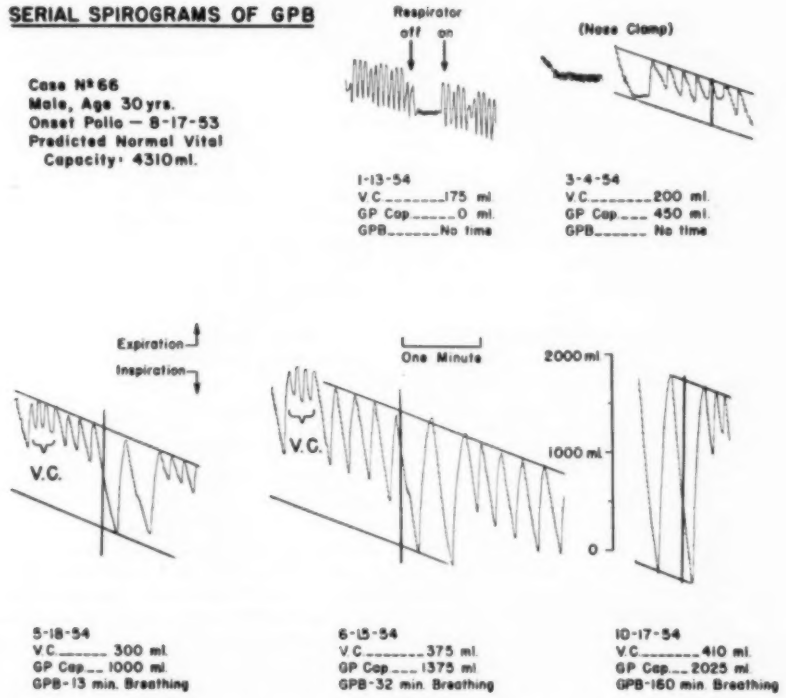

Figure 2. Spirograms from a patient with respiratory muscle paralysis taken during and after learning glossopharyngeal breathing. See text for further description. (From Dail, et al. A Manual of Instruction for Glossopharyngeal Breathing. National Foundation for Infantile Paralysis, New York, 1955.)

is closed and air is trapped in the trachea and lungs. This stroke-by-stroke filling of the lungs is inspiration. The amount of air accumulated in the lungs from a series of about 10 such strokes is comparable to a good-sized breath. Expiration then results when the larynx is opened and the accumulated air escapes passively.

We have described the method of GPB most commonly used. Individual patients have varied this somewhat. A few are able to draw air through the nose, the mouth being continually closed. This method is usually not as efficient since the amount of air that can be moved is less; however, if it can be used it is desirable because the air is humidified and the movements are less conspicuous. Some patients do not close the lips during step two of the stroke, but use the tongue to valve the air. Quite commonly the patient prefers to initiate each breath by a limited action of the ordinary inspiratory muscles.

Glossopharyngeal breathing is described by animation, fluoroscopy, and patient demonstration in a motion picture film* prepared primarily for presentation to medical personnel, rather than as an aid in teaching.

Description of Cases

In the clinical evaluation of patients who are being taught GPB, serial tracings are made on a basal metabolism spirograph (Sanborn), which gives a documented accomplishment record of each patient. Serial tracings also aid in the analysis of problems that the patient may have in the process of learning. The tracings in figure 2 are taken from a patient who developed extensive paralysis in the summer of 1953. His instruction in GPB began early in January, 1954. As evidenced by tracing "A" he was able to

* See reference 1.

demonstrate a stroke-like motion by January 13, but he could not move any air into the lungs. Tracing "B" taken in March shows improvement in the size of the stroke, but still no air is accumulating. When the nose is closed by a clamp, appreciable air can be moved. This indicates that the patient had not yet learned to close off the nose with the soft palate. Note the marked progressive improvement between May and October. The tracings demonstrate improvement in stroke volume and frequency, in the maximal breath that the patient could take, and in the length of time that the patient could breathe.

This patient had more than average difficulty in learning the technic, but after months of perseverance he finally succeeded and at the present time is one of the more successful GP breathers. He still has a tracheostomy but has not needed tracheal suctioning for several months, which he feels is because with GPB he is able to cough sufficiently well to raise mucus. The patient is now free of respiratory equipment several hours a day and he is able to exercise his weak diaphragm frequently. He accomplishes this by discontinuing glossopharyngeal breathing for a few moments while he breathes properly. He does not have to wait for someone to open the respirator in order to exercise the weak respiratory muscles.

Of the 200 patients we have observed doing glossopharyngeal breathing 133 were instructed by hospital personnel, 32 learned without appreciable help, 28 learned from other patients, and 7 performed GPB spontaneously. Of this total, 70 patients depend on GPB for unassisted breathing. With the muscles normally used for respiration they can breathe for two or three minutes. With GPB these same patients are able to breathe from two to eight hours. Forty patients use GPB for assistance in breathing. With GPB as assistance they can remain free of respiratory equipment longer and engage in more treatment activities. Although all patients make use of GPB to improve their ability to cough, 90 patients, who have adequate vital capacity for breathing, have learned the technic primarily for assistance in coughing. We are confident that serious respiratory complications have been prevented in many of these patients because of their greater ability to remove accumulated mucus from the airway. All patients are encouraged to take occasional deep breaths to stretch the lungs and chest. Many patients are pleased that their voices are stronger and they can form longer phrases with one breath.

A study of these cases clearly points out the advantages of glossopharyngeal breathing. These patients have a self-developed emergency respirator which they can use in the event of failure of mechanical respiratory equipment. This alleviates the fear common to this type of patient. They can be free of the respirator for ordinary nursing care, to have tub baths, to attend occupational therapy classes, to go to the gymnasium for treatment, to attend social functions, to go for automobile rides, and even to carry on their business. It is obvious that the patient's morale improves greatly with these accomplishments. The work of the nurse and the physical therapist is simplified. Reeducation of the normal breathing pattern is facilitated.

CONTRAINDICATIONS, LIMITATIONS, AND PRECAUTIONS

Patients with adequate vital capacity, with good diaphragm strength, strong abdominal muscles, a flexible rib cage, and strong intercostal muscles have no need to learn GPB. This may seem to be a superfluous statement, but several times we have had to deny instruction to some patients because others needed it more.

It is impossible for patients with severe involvement of the throat muscles to learn this technic. Therefore, it is contraindicated because an attempt to learn only creates further discouragement.

Glossopharyngeal breathing is contraindicated for patients with failing cardiac function or active pulmonary infections. Medical complications may temporarily constitute a contraindication because of general weakness and need for rest. If a patient is frequently fatigued for any reason, instruction should be delayed until the condition is corrected since learning may be quite tiring. In the severely involved cases instruction should not begin until the patient is medically stabilized. This may be several months after the onset of the paralysis.

Patients cannot do glossopharyngeal breathing while sleeping and usually cannot eat during GPB. Patients with open tracheostomies cannot do GPB and if the tracheostomy tube leaks, the lungs cannot fill with air. Pressure from GPB may dislodge a loosely fitting tracheostomy stopper. This is a danger that must be prevented by making the stopper fit very securely in the tracheostomy and checking the fit frequently. Laryngeal irritation can make this breathing ineffective by producing incoordination and laryngeal spasm.

The cosmetic aspect may be considered a limitation since the motions may look peculiar to the patient as well as to others. However, this can be minimized by practice and by learning to breathe through the nose.

In coughing with GPB, the intrapleural pressure rises and may tend to interfere with the return of venous blood to the heart. When pressures are excessive the patient may complain of fullness in the head and possibly a feeling of fainting. The patient's pulse should be checked before he is allowed to use GPB for chest stretching and coughing. He should not be permitted to breathe so deeply as to cause appreciable weakening of the pulse. To counteract the effect on the pulse, the chest should be simultaneously expanded with the accessory muscles during the height of the maximal GPB inspiration.

Since there may be limitations and contraindications to GPB, instruction should always be under medical direction.

TEACHING GLOSSOPHARYNGEAL BREATHING

Some patients learn to do GPB without any instruction whatsoever while some learn well from other patients; however, it has been our experience that the best way for patients to learn is to be taught by an instructor.

The qualifications of the GPB instructor are particularly important. Above all, he should have a strong personal interest in the rehabilitation goals of the patient. He should have close contact with the patient, preferably several times a day. There must be close rapport between the instructor and the patient. Although it is desirable that the instructor be able to actually do glossopharyngeal breathing himself, this is not necessarily imperative. At least he must have a personal knowledge of how the technic functions, and be able to demonstrate this to the patient. Of course, he should reflect his enthusiasm in the value and expected success of the teaching project. To be able to do this, he must have a reasonably accurate knowledge of what eventually can be expected in each individual patient. In other words, how is glossopharyngeal breathing expected to fit into the patient's rehabilitation program? Above all, the instructor must have patience and persistence in his work and he must be able to develop these qualities in the patient, for in most cases the learning process requires weeks and months. The learning time required by the more severely paralyzed patient is usually longer.

The instructor may be a successful teacher even though he does not have a background in physical therapy and has no knowledge of anatomy. Patients who have learned the technic may teach successfully. Certainly, a physical therapist or speech therapist who has acquired a good understanding of anatomy and who is able to do GPB himself, would have advantages as a teacher. This is especially true if the patient has weakness of the participating structures and is not able to breathe unassisted.

Before beginning the program of instruction, it is important that the patient understand what is intended to be accomplished. The general principle of glossopharyngeal breathing should be briefly described to him. The advantages should be given and it should be explained that glossopharyngeal breathing will aid in the development of proper breathing and in no way hinder normal breathing. The aims in the particular case should be clearly described to the patient. One should not attempt to go ahead with the instruction program unless the patient becomes enthusiastic about it. During the learning process the patient will need continual encouragement.

We will not attempt to present the actual technic of teaching at this time; however, we have prepared a manual describing the current technic of teaching† which may be obtained on request from the National Foundation for Infantile Paralysis. It should be emphasized that learning GPB may be difficult but that even with much effort it is worth while. One should weigh the cost before starting. Many of our successful patients have taken several months to learn.

CONCLUSION

The value of glossopharygneal breathing to those who have impaired breathing ability cannot be overestimated. The advantages are medical, social, psychological, and economic. Many patients state that their lives have been changed by having learned GPB. Those persons who have no tolerance emphasize the fact that they no longer live under the tension caused by the thought of a power failure, and this is worth any amount of effort required in learning.

It is important to remember that GPB does not hinder the development of the normal breathing pattern. In fact, many have experienced an increase in diaphragm function after mastering it because it gave opportunity to practice diaphragm breathing repeatedly during the day. In our experience we have found no ill effects

† See reference 2.

resulting from the use of glossopharyngeal breathing.

It is important that persistent effort be put forth on behalf of these patients. Some learn without instruction and some with very little instruction, but there is that group which will require patient, persevering work over a period of months. To insure ultimate success in these cases it is imperative that they have adequate rest. Their fears must be allayed. Patients cannot breathe effectively unless they are relaxed. Consequently, they must be led rather than forced into breathing. They will need much encouragement while attempting to learn. The instructor should be enthusiastic in order to meet this need and inspire confidence in the patients.

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Functional Activity Testing— A Report of a Survey

Ruth Cook, M.A.

Those of us who are concerned with the practice of "rehabilitation" are in a challenging, but often frustrating, position. For perhaps the first time in the history of medicine a philosophy of action has preceded the development of technics necessary to implement the philosophy. This reversal, together with the rapid development of rehabilitation facilities in the United States and the dearth of written clinical material has, heretofore, made it incumbent on the staff of each center to develop, and to mold, procedures which suffice to meet the needs of the particular rehabilitation facility or the particular patient group.

This method of operation, though necessary in the early days, is insular, time consuming, and expensive, particularly with respect to tests and measurements, and training technics common to all rehabilitation facilities.

It is, and has been, our feeling that activities of daily living (ADL), or functional activity (FA) testing, has become a common tool in rehabilitation programs. Over an eight year period (1948-1954), experience at the Morrison Center for Rehabilitation with administering and modifying the ADL tests available has led us to believe that there is a necessity for national standardization of a functional activity test and that such standardization is now feasible.

In order to determine the nature, scope, and types of procedures used in ADL testing throughout the United States, to test our hypothesis, and to evaluate our own problems in this field, the Morrison Center, in October of 1954, requested the cooperation of 43 rehabilitation centers in completing a survey of ADL testing.

Thirty-nine rehabilitation centers asked to participate were those listed with the 1952 National Conference of Rehabilitation Centers. Three centers known to the Conference in 1953 and one center known to have a rehabilitation program of national note were also asked to participate.

A questionnaire dealing with various aspects of ADL testing was sent to each center. A request was made for copies of tests used, including any special tests given to amputees, housewives, and children. The returned questionnaires were reviewed and tabulated. The ADL tests were compared for format, number of items tested, categories or areas of testing, and scoring method.

Reports were received from 32 centers

Coordinator, Education and Research, May T. Morrison Center for Rehabilitation, San Francisco.

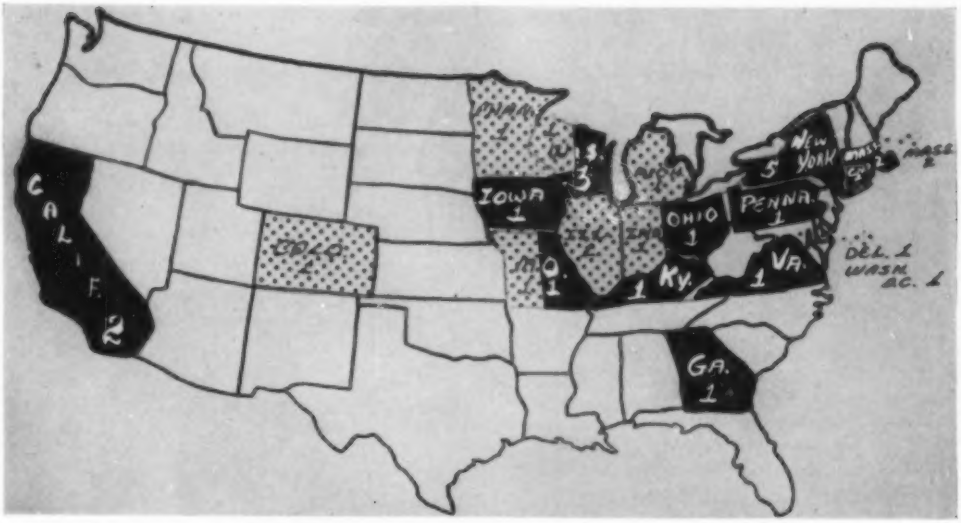

Figure 1. Location of centers reporting to functional test survey. Centers from states shown in black reported by questionnaire. Dotted areas indicate the location of centers reporting by letter. Numerals represent number of centers reporting in each category.

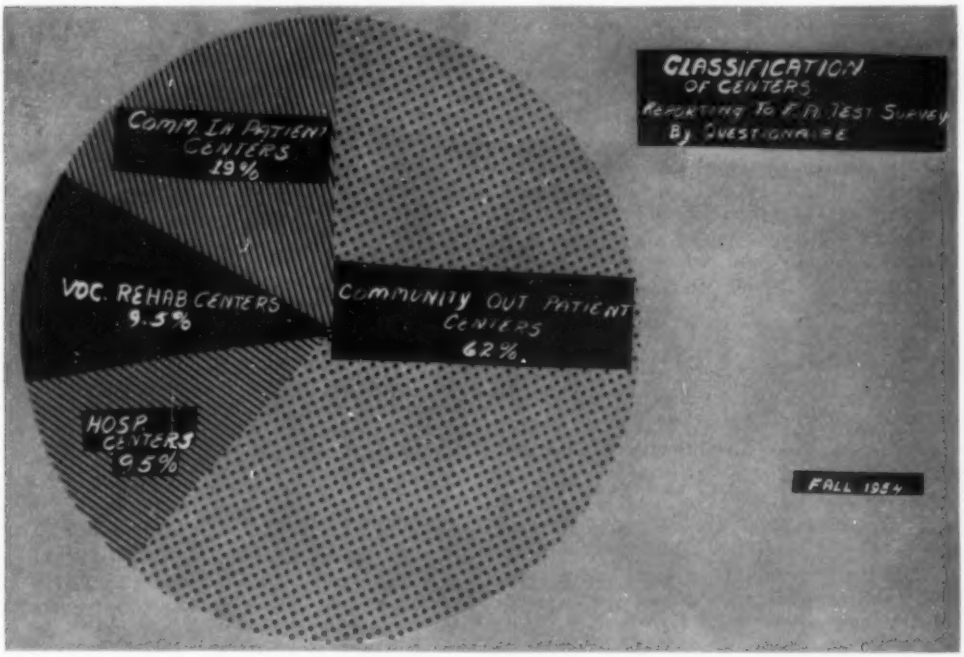
CLASSIFICATION OF CENTERS REPORTING TO F.A. TEST SURVEY BY QUESTIONNAIRE
COMM. IN PATIENT CENTERS 19%
VOC. REHAB CENTERS 9.5%
COMMUNITY OUT PATIENT CENTERS 62%
HOSP. CENTERS 9.5%
FALL 1954

Figure 2. Classification of rehabilitation centers reporting to the survey by questionnaire. The classification is that of the National Conference of Rehabilitation Centers. The percentages represent the ratio of centers in a particular category to the total number reporting by questionnaire.

(74.4 per cent). Of this group, 21 centers were doing ADL testing and had done so over a long enough period to answer the questionnaire.

The locations of the centers reporting by questionnaire are outlined in black in figure 1. Classifications for this group, according to the National Conference are as follows:

13 community outpatient centers.
4 community inpatient centers.
2 vocational rehabilitation centers.
2 hospital centers.

Figure 2 indicates this classification in percentage of the total number of centers answering the questionnaire.

Eleven centers, the locations of which are shown in the dotted sections of figure 1, reported by letter that they were unable to participate in the study for one of the following reasons:

1. Four centers stated that the type of patient disabilities treated in their particular center made ADL tests inapplicable to the program. Two of these centers were classified as insurance centers, one as a community outpatient center and one as a community inpatient center.

2. Two centers stated that progress notes were a sufficient record. One of this group was classified as a community outpatient center and one as a community inpatient center.

3. Three centers, all of the community outpatient type, stated that they were working on an ADL test suitable for their own needs and either had not completed it or had not used it long enough to evaluate it properly.

4. Two centers stated that the questionnaire was not applicable and did not give a reason.

Eleven centers did not respond by letter or by questionnaire.

QUESTIONNAIRE

Questions asked on the questionnaire and the responses to them are as follows:

1. *Are you satisfied with the items on the ADL test which you are presently using?* Yes–15; No–6; Total reporting–21.

2. *Are you satisfied with the present scoring system?* Yes–17; No–3; Total reporting–20.

3. *Is the present scoring system quickly and easily understood by new therapists?* Yes–20; No–0; Total reporting–20.

4. *Does one person in the department do all the FA testing?* Yes–9; No–12; Total reporting–21.

5. *If more than one person does the testing, are there discrepancies?* Yes–1; No–10; Total reporting–11.

6. *With a* severely *involved patient what is the average length of time it takes to complete an ADL test?* (Fig. 3)

a. 1 to 2 days	10
b. 2 to 5 days	6
c. 5 to 10 days	4
d. variable	1
Total reporting	21

7. *With a* moderately *involved patient what is the average length of time it takes to complete an ADL test?* (Fig. 3)

a. 1 to 2 days	15
b. 2 to 5 days	5
c. 5 to 10 days	0
d. variable	1
Total reporting	21

8. *ADL re-tests are done—*

a. once monthly	3
b. 1 to 3 months	8
c. 3 to 6 months	4
d. at entrance and discharge	8
e. variable	1

Total reporting—18

Note: 3 Centers answered c. and d.
2 centers answered a. and d.
1 center answered b. and d.

9. *Have you ever used a different method of scoring from that used at present?* Yes–15; No–6; Total reporting–21.

10. *What was the previous system?*

a. Solely a time test	1
b. Combined time and symbol	10
c. Check system	1
Total reporting	12

11. *Did you change because the other method was—*

a. inadequate	8
b. too difficult to give	2
c. not easily understood	6
d. Other	1 (Too broad)

Total reporting—14

Note: 3 centers answered a. and c.

12. *Do you consider your scoring method to be an adequate guide to the degree of performance (how much of an activity a patient accomplishes) with or without assistance for—*

	Yes	No	Total reporting
a. one complete activity?	12	2	14
b. part of one activity?	9	2	11
c. all activities?	15	1	16

13. *Do you consider your scoring system to be an adequate guide to the quality* (speed, safety, agility, endurance) *of performance for—*

	Yes	No	Total reporting
a. one complete activity?	9	3	12
b. part of one activity?	7	3	10
c. all activities?	9	5	14

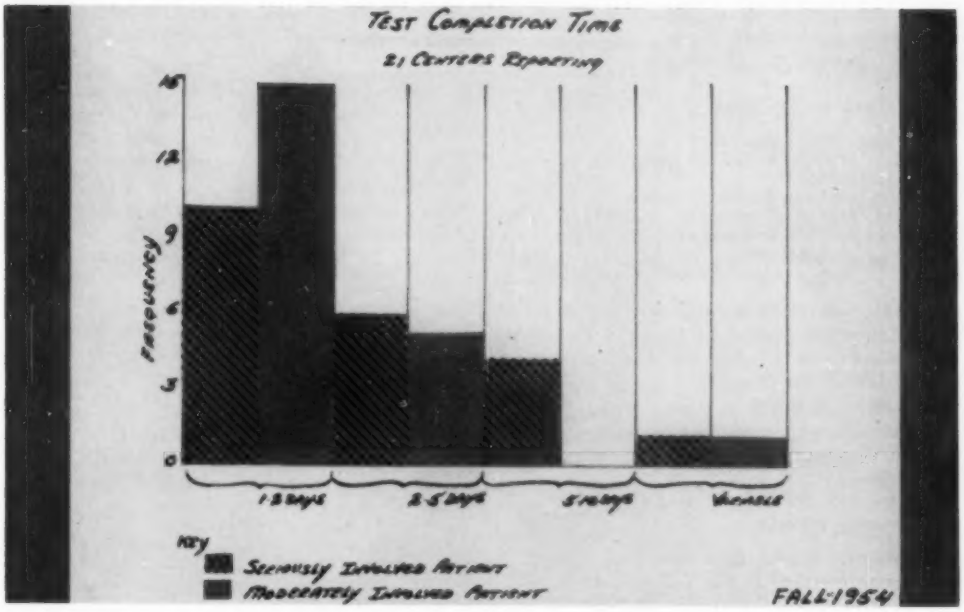

Figure 3. Completion time for an ADL test. It will be noted that the more severely involved the patient is the longer it takes a proportionately larger number of centers to complete a test.

14. *Do you consider your scoring system an adequate guide to the time taken to perform—*

	Yes	No	Total reporting
a. all activities?	4	11	15
b. some activities?	9	4	13

15. *Could the number of items (in all areas of activity) performed by a patient in* bed *be determined—*

a. easily?	4
b. with moderate ease?	7
c. with some difficulty?	5
Total reporting	16

16. *Could the number of items performed by a patient in his* wheel chair *be determined—*

a. easily?	8
b. with moderate ease?	9
c. with some difficulty?	1
Total reporting	18

17. *Could the number of items performed by a patient in the* standing position *be determined—*

a. easily?	12
b. with moderate ease?	7
c. with some difficulty?	0
Total reporting	19

18. *Do you record what kind of apparatus is worn at the time of each test by—*

a. writing it in?	17
b. checking it off in a separate section?	1
c. using a symbol for each type of appliance?	1
Total reporting	19

19. *Using your scoring system, have you ever tried to correlate statistically—*

	Yes	No	Total reporting
a. admission status with discharge status?	11	10	21
b. discharge status with postdischarge status?	3	14	17

20. *On the basis of scoring only, do you feel that such correlation could be obtained—*

	Yes
a. with comparative ease?	6
b. with moderate difficulty?	9
c. with difficulty?	5
Total reporting	20

21. *Are you using a "short" FA form in addition to your standard one?*

Yes—6, No—14, Total reporting—20

22. *If you have a "short" form do you find it—*

	Yes	No
a. as useful as you had hoped?	3	1
b. not used?	0	
c. used only by certain persons?	0	
d. used by all interested personnel?	2	
e. too soon to evaluate?	2	
Total reporting		6

Note: 2 centers answered a. and d.

23. *Do you think a single FA test could be drawn up which would be standard for all rehabilitation centers?* Yes–13; No–7; Questionable–1 Total reporting–21

Nineteen rehabilitation centers returned functional activity test forms used by their particular facility. Comparison of these test forms shows the following:

1. Scoring systems

Thirteen centers used the block system of scoring described in the Veterans Administration Pamphlet 10-10-1946, entitled "What's My Score," or used a check or symbols (X, /, O, etc.) in a similar manner. The meaning of the check, or symbols, was essentially that for for the filled in blocks of the "What's My Score" system.

Five centers used grades (i.e., O, P, F, G, etc.) or numbers (i.e., 1, 2, 3, 4, etc.) to qualify performance. The only essential difference between centers in the meaning of grades or numbers lay in the degree of emphasis placed on amount of independent performance under specific conditions in given time, versus the quality of performance with and without environmental adaptions and/or appliances.

One center (New York State Rehabilitation Hospital) made use of three symbols (O, /, X) to grade performance, independence and time, i.e., in the column for "Performance" a "/" meant "Performs awkwardly or needs more practice"; in the column for "Independence" it meant "Assistance necessary only for reasons of safety"; in the column for "Time" it meant "Requires not more than twice the allotted time."

2. Summary scores

Only two of the 19 tests reviewed made use of summary scores. The 1949 version of the Georgia Warm Springs test permitted a percentage score based on the ratio of number of items performed independently to the number of items to be tested.

The New York State Rehabilitation Hospital test devised by Hoberman and Cicenia, 1952, made use of a numerical rating assigned to each symbol thus permitting a category and/or total test score expressed as the ratio between test performance and the maximum score attainable.

3. Number of test items

The total number of items tested by this group of 19 centers ranged from 22 to 246, the mean number being 116 (Fig. 4).

4. Types of items tested

All centers, except one, tested similar items in the areas which were common to all centers. The only basic difference lay in the detail of breakdown for each item.

5. Item groups or categories

a. Four centers used major headings of Walking and Nonwalking activities. These 4 centers and 12 others used major and subheadings as follows:

TITLE	*Number of Centers Using the Heading*
Bed Activities	8
Eating	11
Hygiene	10
Dressing	10
Self-Care Activities	1
Communication	4
Walking or Ambulation	9
Locomotion	2
Progressing	3
Wheel Chair Locomotion	5
Climbing	4
Elevation	4
Apparatus or Appliances	5
Household Activities	5
Hand Activities	6
Utilities	1

Other categories of items used by two or less of the 16 centers were: driving, endurance, work tolerance, recreation, and shopping.

b. One center categorized items according to developmental progression, i.e., rolling, crawling, reciprocating, and kneeling.

c. One center used no item categorization.

d. One center used scoring columns entitled Bed, Wheel Chair, Ambulatory without Apparatus, and Ambulatory with Apparatus, for grouping items and classifying patients.

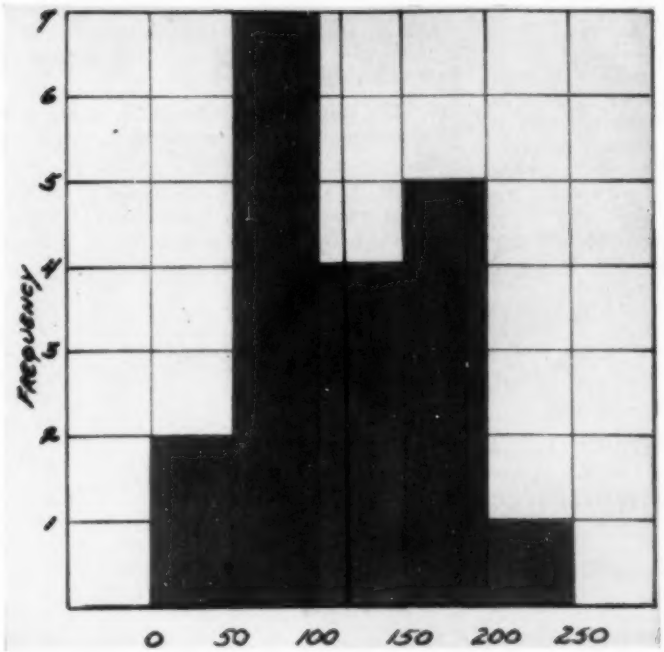

Figure 4.

6. **Special tests**

Eight centers used a special test for amputees.

Four centers used a special test for children (or were in the process of developing such a test).

Five centers used a special household activities test.

Other tests used by one or two facilities were those for Work Evaluation and Hand Preference.

SUMMARY

A survey of practices in ADL testing was undertaken by the Morrison Center for Rehabilitation in the fall of 1954. Forty-three centers were asked to fill out a questionnaire and to return copies of functional activity tests in current use at their centers.

Twenty-one centers responded by questionnaire (49 per cent).

Eleven centers, responding by letter, stated that they were unable to participate (25.5 per cent).

Eleven centers did not respond (25.5 per cent).

Nineteen centers returned sample test forms for review and comparison.

Analysis of the responses to questions asked on the questionnaire and review of the ADL tests returned indicate that:

1. The majority of centers were satisfied with both the items and the scoring system in current use at their centers. The majority of this group (13 centers) were using either the "What's My Score" system or a modification of it. Only three centers, however, had tried to correlate discharge status with postdischarge status by using ADL test criteria.

2. Of the 21 centers reporting, 71 per cent take one to two days to complete a functional activity test on a moderately involved patient, but only 48 per cent are able to complete a test in this length of time on a severely involved patient. With this type of patient 48 per cent of the centers reporting take from 2 to 10 days to complete an ADL test.

3. The mean number of items tested by 19 centers was 116.

4. Two centers do ADL tests at entrance, at discharge, and at monthly intervals. Three centers test at entrance and discharge and at intervals of three to six months. One center tests at entrance, discharge, and at intervals of one to three months. Two centers test only at entrance and discharge, one at monthly intervals, seven at intervals of one to three months, one at intervals of three to six months, and one at varying times.

5. The majority of centers had used different scoring systems from that presently in use at their center, and the two major reasons for changing from what had been a time and symbol method were inadequacy and lack of ease of understanding.

6. The majority of centers write in the type of apparatus a patient is wearing on each test date.

7. Of the 21 centers participating, 70 per cent felt that a single ADL test could be formulated which would be standard for all rehabilitation centers.

Recovery of Power in Leg Muscles Following Poliomyelitis

Robert Palmer, and Carl D. Martz, M.D.

This work was undertaken with a three-fold purpose, the first of which was to study the return of function in muscles weakened by poliomyelitis. We were also interested in determining whether early muscle examinations have prognostic value and what the ultimate fate of muscles whose insertion had been transferred might be.

One hundred and thirty cases of poliomyelitis were studied. The group included children who were from 5 to 12 years of age when they contracted polio. All had involvement of muscles below the knee requiring physical therapy. The dates of onset were quite evenly distributed over a ten year period.

Due to confinement in respirators, many cases had not had muscle analyses adequate for classification prior to two months after the onset of polio; therefore, two months was selected as the base period. Thus, muscles testing "out" after two months of paralysis were called base O, base T for those testing "trace," base P for those testing "poor," base F for "fair," base G for "good," and base N for "normal."

In all, 997 individual muscles were included in the analysis of 130 cases. Their behavior during and at the close of recovery and following surgery is set forth in the following graphic form.

Key to Graphs

Minimum and maximum rating given any muscle in the group at the given time are shown by the enclosed area on the graph.
Average ratings of all muscles in the group are shown by the line running through the enclosed area.

Muscles rated on the nonweight-bearing scale are represented by solid lines.
Muscles rated on the weight-bearing scale are represented by broken lines.

Discussion

This study was confined to muscles which move the foot. Similar results may not be found in the muscles of the upper extremity. Indeed, Scharrard's study suggests that the rate and extent of recovery in the muscles of the upper extremity are greater than those of the lower.

Muscles which test base O or Trace carry a poor prognosis. Of the 196 muscles testing O at six to ten weeks, 181 (92.34 per cent) tested O or T on their final test. Only 7 (2.04 per cent) reached F. Of 76 muscles testing T at this period, 59 (77.64 per cent) tested P at their final test. Of all of the muscles analyzed in these two

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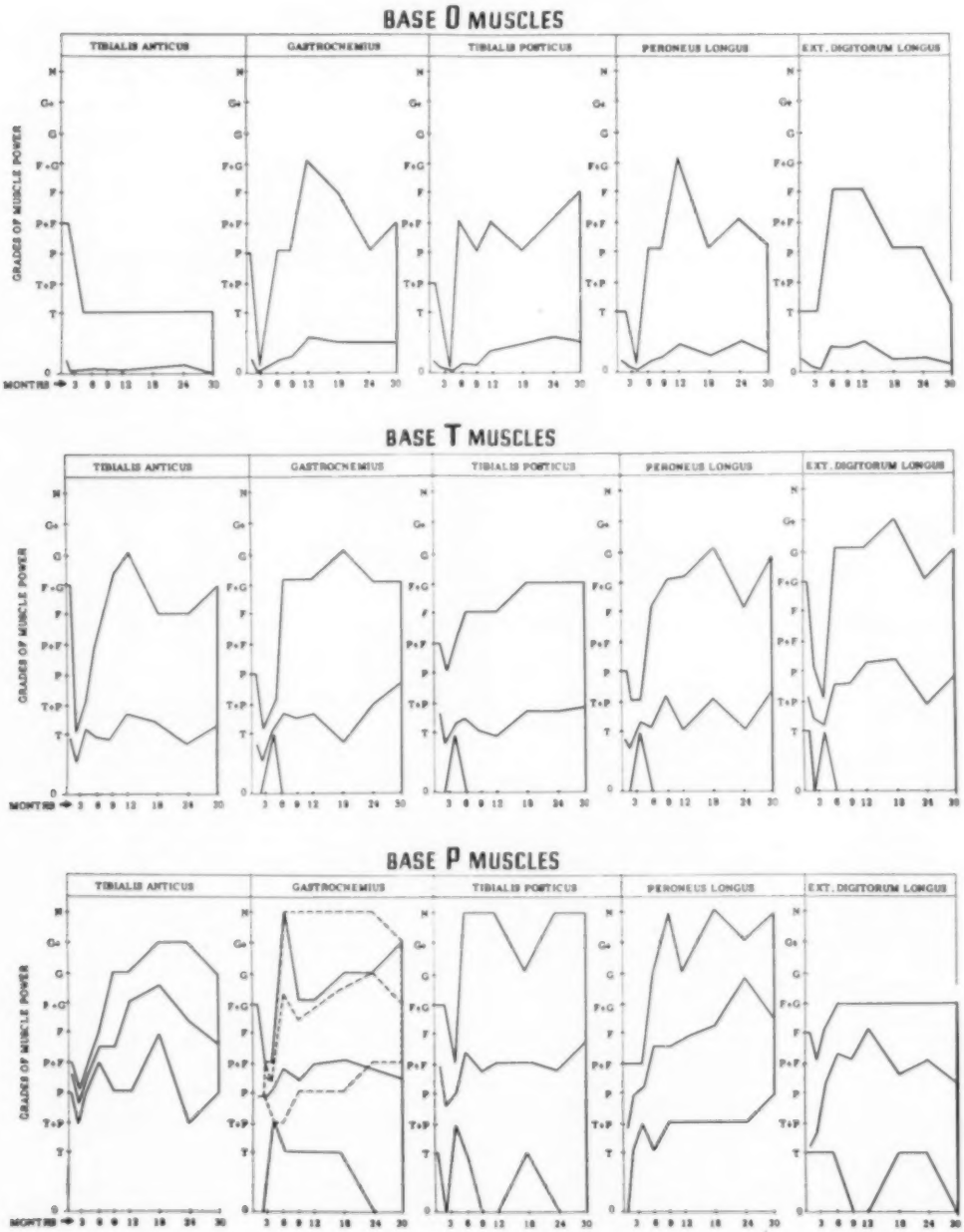
POWER OF MUSCLES WHEN LAST EVALUATED

Time Base	Time Final	Ant Tib #	Ant Tib %	Gastroc #	Gastroc %	Post Tib #	Post Tib %	Peron L #	Peron L %	E D L #	E D L %	Totals #	Totals %
O	O	45	81.81	21	72.41	38	84.44	27	81.82	29	85.29	160	81.63
O	T	10	18.18	3	10.34	5	11.11	1	3.03	2	5.88	21	10.71
O	T/P-	--	-- --	2	6.90	1	2.22	--	-- --	--	-- --	3	1.53
O	P	--	-- --	2	6.90	--	-- --	2	6.06	--	-- --	4	2.41
O	P/F-	--	-- --	--	-- --	1	2.22	2	6.06	1	2.94	4	2.41
O	F	--	-- --	1	3.45	--	-- --	--	-- --	2	5.88	3	1.53
O	F/G-	--	-- --	--	-- --	--	-- --	1	3.03	--	-- --	1	0.51
T	O	12	52.17	5	29.41	5	33.33	4	33.33	5	55.56	31	40.79
T	T	8	34.78	2	11.76	5	33.33	4	33.33	1	11.11	20	26.32
T	T/P-	3	13.04	2	11.76	2	13.33	1	8.33	--	-- --	8	10.53
T	P	--	-- --	6	35.29	1	6.67	--	-- --	--	-- --	7	9.21
T	P/F-	--	-- --	--	-- --	1	6.67	1	8.33	--	-- --	2	2.36
T	F	--	-- --	1	5.88	--	-- --	--	-- --	--	-- --	1	1.32
T	F/G-	--	-- --	1	5.88	1	6.67	1	8.33	2	22.22	5	6.58
T	G	--	-- --	--	-- --	--	-- --	1	8.33	--	-- --	1	1.32
T	N	--	-- --	--	-- --	--	-- --	--	-- --	1	11.11	1	1.32
P	O	4	20.00	2	7.41	3	27.27	1	10.00	--	-- --	10	13.51
P	T	1	5.00	1	3.70	--	-- --	--	-- --	1	16.67	3	4.05
P	T/P-	1	5.00	1	3.70	1	9.09	1	10.00	1	16.67	5	6.76
P	P	2	10.00	3	11.11	--	-- --	1	10.00	--	-- --	6	8.10
P	P/F-	2	10.00	5	18.52	--	-- --	1	10.00	--	-- --	8	10.81
P	F	4	20.00	3	11.11	3	27.27	--	-- --	2	33.33	12	16.21
P	F/G-	5	25.00	2	7.41	3	27.27	2	20.00	2	33.33	14	18.91
P	G	--	-- --	5	18.52	--	-- --	2	20.00	--	-- --	7	9.46
P	G/	1	5.00	1	3.70	--	-- --	1	10.00	--	-- --	3	4.05
P	N	--	-- --	4	14.81	1	9.09	1	10.00	--	-- --	6	8.10
F	O	1	5.56	2	6.25	--	-- --	1	5.00	1	6.67	5	4.59
F	T	1	5.56	--	-- --	--	-- --	--	-- --	1	6.67	2	1.83
F	T/P-	1	5.56	--	-- --	1	4.17	--	-- --	--	-- --	2	1.83
F	P	--	-- --	1	3.13	--	-- --	--	-- --	--	-- --	1	0.92
F	P/F-	2	11.11	1	3.13	2	8.33	1	5.00	--	-- --	6	5.50
F	F	1	5.56	4	12.50	3	12.50	1	5.00	2	13.33	11	10.09
F	F/G-	5	27.78	4	12.50	5	20.83	3	15.00	--	-- --	17	15.60
F	G	2	11.11	7	21.88	5	20.83	5	25.00	5	33.33	24	22.02
F	G/	1	5.56	--	-- --	2	8.33	3	15.00	--	-- --	6	5.50
F	N	4	22.22	13	40.63	6	25.00	6	30.00	6	40.00	35	32.11
G	T	1	2.44	--	-- --	--	-- --	--	-- --	--	-- --	1	0.46
G	P/F-	--	-- --	--	-- --	1	2.08	1	1.96	--	-- --	2	0.92
G	F	--	-- --	--	-- --	1	2.08	--	-- --	2	4.26	3	1.38
G	F/G-	3	7.32	1	3.33	5	10.42	--	-- --	1	2.13	10	4.61
G	G	--	-- --	5	16.67	4	8.33	3	5.88	5	10.64	17	7.83
G	G/	9	21.95	4	13.33	7	14.58	5	9.80	5	10.64	30	13.82
G	N	28	68.29	20	66.67	30	62.50	42	82.35	34	72.34	154	70.97
N	F/G-	--	-- --	--	-- --	1	1.72	--	-- --	--	-- --	1	0.31
N	G	1	1.35	--	-- --	2	3.45	1	1.47	--	-- --	4	1.23
N	G/	2	2.70	3	5.45	--	-- --	4	5.88	5	7.14	14	4.31
N	N	71	95.95	52	94.55	55	94.83	63	92.65	65	92.86	306	94.15
Total		231		190		201		194		181		997	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GASTROCNEMIUS
TIBIALIS POSTICUS
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EXT. DIGITORUM LONGUS
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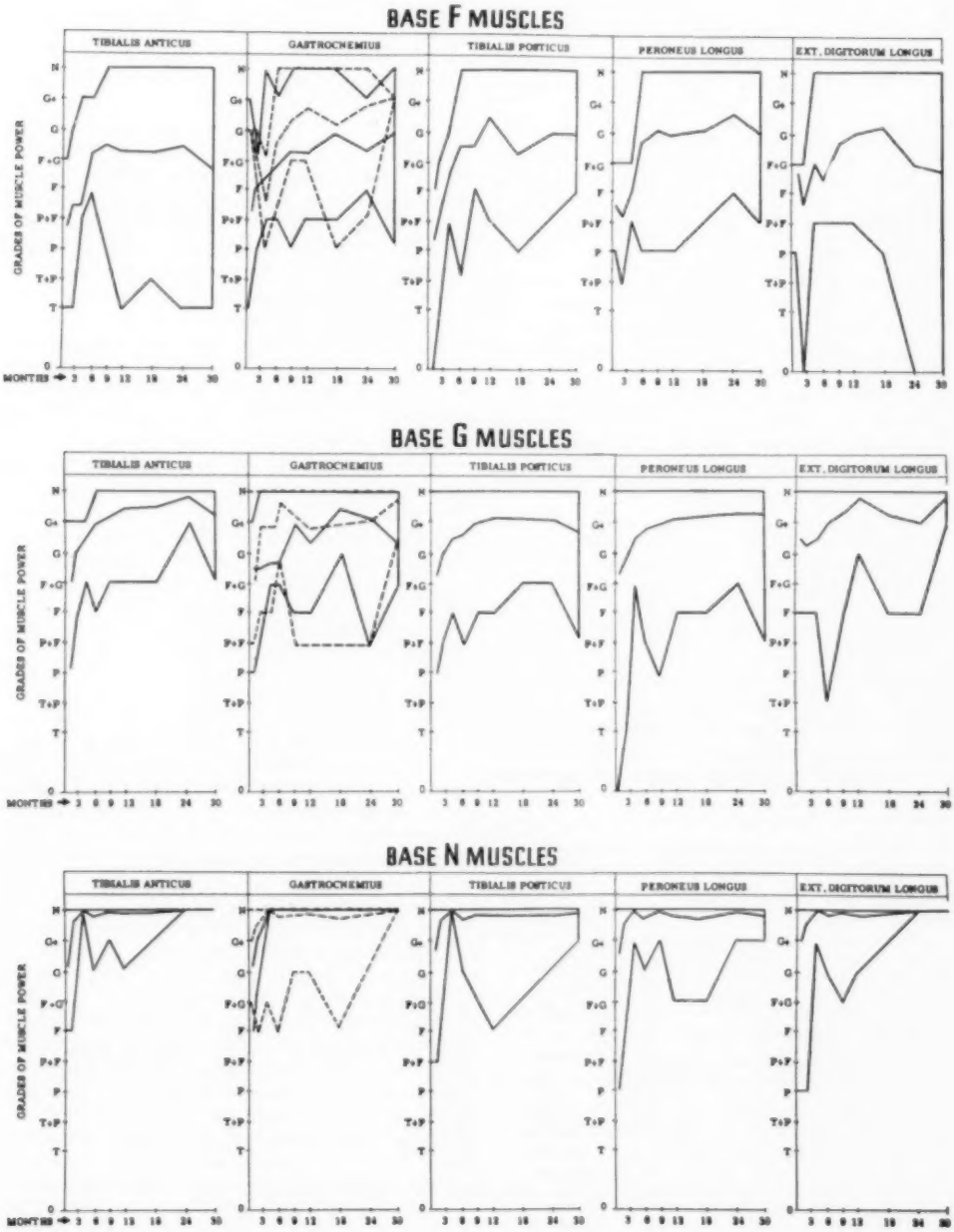
BASE F MUSCLES
BASE G MUSCLES
BASE N MUSCLES
TIBIALIS ANTICUS
GASTROCNEMIUS
TIBIALIS POSTICUS
PERONEUS LONGUS
EXT. DIGITORUM LONGUS
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3 6 9 12 18 24 30

groups, the anterior tibials averaged lowest on the graphs by a half to a full grade of power. No anterior tibial testing base O rose above T when last seen and none testing T rose above P.

According to a recent publication by Scharrard, improvement rates would be shown to be much higher in this study if the 206 (20.64 per cent) muscles which never regained any power were eliminated from the study. We cannot justify such an omission, however, for we are concerned with the ultimate outcome of all muscles.

The recovery course of base P and F muscles appears unpredictable. Seventy-four muscles fell into the base P group and 109 into the base F. Of the former, 10 (13.51 per cent) tested O on the final test and 6 (8.10 per cent) tested N. Of those testing base F, 5 (4.49 per cent) tested O and 35 (32.11 per cent) N when last seen. It is apparent that base P muscles present a less favorable outlook than those of base F. In both of these groups there was distribution of muscle grades between the extremes. The group testing base G and N undoubtedly includes some muscles whose nerve supply was not affected by poliomyelitis. However, in several cases muscles which had been rated normal from the onset of the illness dropped as much as one grade of recorded muscle power.

In general, base G to N muscles do well. Of the 217 base G muscles analyzed, 201 tested G or better when last seen and 154 of them tested N. These figures represent 92.62 per cent and 70.97 per cent respectively of all base G muscles analyzed. There were 325 base N muscles analyzed. Of these, 324 (99.64 per cent) were G or better when last seen and 306 (94.15 per cent) tested N. No muscles in these two groups fell to O at final testing and only three fell below F.

TABLE I

POWER OF MUSCLES

Muscle power at 6 to 10 weeks (base)	Muscle power when last seen
O — 196 — 19.60%	O — 206 — 20.66%
T — 76 — 7.62%	T — 55 — 5.52%
P — 74 — 7.42%	P — 40 — 4.01%
F — 109 — 10.93%	F — 74 — 7.42%
G — 217 — 21.77%	G — 120 — 12.04%
N — 325 — 32.60%	N — 502 — 50.35%

Comparison of the graphs of these "top" grades indicates that anterior tibial muscles so affected tend to improve more rapidly than other muscles with the same base. Also they have one of the highest percentages of muscles testing N when last seen. Thus, in this study, the anterior tibial presents a paradox. When found in the lower base group it offers the poorest prognosis of the muscles analyzed; when found in the higher group it offers one of the best. The poor recovery may well be on the basis of alienation. In several cases of equinus the anterior tibial gained power only to lose ground as the triceps surae became stronger. Since even a muscle testing O at one month may gain some power, it seems advisable to prevent the formation of an equinus deformity by every possible means.

One limitation of this study was apparent to us. Frequently muscle analyses on the more seriously ill patients were deferred beyond the one month period. We were faced, therefore, with reduced data for this period. Trends, however, may be noted which indicate that the rapid recovery in the early stages may be real as well as apparent on our graphs.

By analysis of the graphs, it appears that the average muscle improves rapidly during the first year after the onset of illness and improves little after that time. Muscles rated base G improve more rapidly and complete most of their recovery by nine or ten months. Some functional improvement occurs in many muscles beyond this time as the patient develops skill and endurance, or as contractures are stretched.

Results of surgery

Muscle transfers were made for two purposes; (1) to lend power to muscles weakened by polio and, (2) to remove a deforming force. Twenty-eight muscle transfers were performed on the cases studied. (see Table II). These muscles are often placed at a mechanical disadvantage by being rerouted and in such procedures a dorsiflexor may become a plantar flexor or may become a medial force rather than a lateral one. A muscle which by its composition is suited for quick action may be expected to replace one of predominately slow but sustained action. Often a relatively weak muscle, i.e., anterior tibial is substituted for a strong one such as the gastrocnemius. It was found that transferred muscles lost power following such procedures. The average power loss for all muscles transferred was 1.85 grades. Thus, a muscle testing G before its insertion is changed may become nonfunctional following the operation. There were differences of power loss in the various procedures but the number of cases studied was too small to provide statistical validity for individual procedures. Only by considering all of the transfers

as a group can any significance be attached to this portion of the work. This study does indicate the likelihood that muscle power will suffer in the transfer and that this possibility should be considered before such an operation is undertaken.

TABLE II

MUSCLES WHOSE INSERTION WAS SURGICALLY TRANSFERRED

Transfer	Av. time mo.	No.	Power Loss (grades) Min.	Max.	Av.
Peabody*	37	7	1.0	3.0	2.00
Peroneals to heel cord	29	4	1.0	2.0	1.25
Peroneals to dorsum of foot	39	9	1.0	2.5	2.12
Peroneals to Anterior tibialis	46	3	2.0	2.0	2.00
Average	34				

Muscle testing

One of the purposes of our study was to determine the prognostic value of the muscle examination as it is now done. As a part of the work, physical therapists performed numerous muscle tests under our observation, but methods appeared somewhat subjective and "human" factors were difficult to overcome. The moods of the physical therapist and patient on a given day were rarely duplicated exactly on another day. Distractions were unavoidable especially when working with children, and a physical therapist may identify with the patient after working with him over a period of time. Added to these factors is one which is inherent in the manner of testing itself. Is a muscle rated normal to the best ability of the tester really normal? Frequently muscles which are normally less strong, i.e., abductors of the fingers, are compared with normally stronger muscles such as the opponens. This is realized and the less strong muscles are graded accordingly. This ability to judge the difference comes to the examiner with experience. However, when normally strong muscles, such as those of locomotion, are compared with the relatively less strong muscles of the arm and hand, can any amount of experience detect minimal weakness if the tester is required to utilize his maximum power without being able to overcome the resistance offered by the muscle being tested? The power of the triceps surae as opposed to the extensor of the elbow joint may easily be compared by performing toe stands to the point of fatigue and then, after a suitable rest period, executing prone push-ups to the point of fatigue. It will be quickly discovered that the gastrocnemius and soleus are much more capable of lifting the body weight than are the triceps brachii. May this not also be true of other muscles of locomotion? This may be demonstrated by the one to two grade difference in the gastrocnemius or soleus which tests normal on the table but is barely able to lift the body weight from the floor when standing. Considering further the cases of deformities developing in joints completely surrounded by muscles rated as normal, it is difficult to see just how these come into being if there is really normal muscle balance around the joint. While our purpose was to evaluate the results of muscle tests, it became apparent that the methods themselves were occasionally productive of error.

A further problem might be presented here concerning the testing of the gastrocnemius and soleus muscles. These are the only muscles in our data that were tested on the double standard of both weight bearing and nonweight bearing. In analysis of the graphs it was found that those muscles tested by the weight-bearing standard were a half-grade to a grade lower than those tested by the manual standard. One is led to the conclusion that the muscles rated on the weight-bearing scale are those which would have raised the curve of the graphs still more had they been recorded on the basis of their nonweight-bearing ability. In light of this it would seem desirable to record both findings on the muscle analysis sheet at each examination where the condition of the patient permits the use of both methods.

How may we correct the shortcomings of these tests? The moods of the participants and identification with the patient appear to be inherent in the system. Scharrard suggests that the physical therapist who treats the child not be responsible for the evaluation of progress. In many instances this is unsatisfactory in working with children for the cooperation of such patients requires the establishment of rapport. We concur with the suggestion that the previous record be consulted only after the examination is completed. Distractions may be minimized by performing analyses in individual rooms apart from the treatment

* The Peabody operation referred to here is a transfer of the anterior tibial muscle through the interosseus membrane into the tendo achillis insertion for the purpose of improving plantar flexion.

area and fatigue can be effectively eliminated by the method of accumulative testing.

Several types of tests have been devised to obtain purely objective ratings of muscle power. These include balanced weights, spring balances (Lovett and Martin), electromyographs and direct nerve stimulation with electric current (Erlacher). All have been highly praised by their proponents and hopefully received by workers in the field. Yet none have become widely accepted. Perhaps the answer lies in the refinement of one of these methods. Work in progress using one muscle and one skin electrode for electromyographic studies may hold promise (Bonsett). One wonders if additional functional tests now in use might be of benefit. Time, further study, and the demands of the practicing physician will produce the answer. We feel that at present the manual testing method is the best available and that additions and refinements of it are the most likely direction of progress.

Records

Record forms for muscle analyses are in a state of revision and vary widely from place to place, but two major types are in common use. One records primarily the function of groups of muscles; we feel that this allows emphasis to shift away from the recovery of each unit of a functioning whole and may allow substitution to occur, where a little more detailed effort might help to achieve more physiologic function. We favor the second type which tests individual muscles. It is realized that certain muscles cannot be tested individually and others only with questionable accuracy, but if normal function is to be achieved and abnormal wear and tear on the joints are to be avoided, we must follow as many muscles as possible and brace and train accordingly. Furthermore, if surgeons are to base the probable result of a transfer on these analyses they must have specific data readily available. It would also seem desirable to attempt a standardization of the record forms, perhaps by a "meeting of the minds" from various parts of the country.

Physicians' records as to the patient's recovery from polio are frequently found to be inadequate and often illegible. We feel that typewritten notes are best. This may require a few more moments spent in dictation but the time saved in reviewing the case at the next visit is great. Pertinent observations should be made a matter of record at each visit and when appliances are prescribed, complete descriptions should be given in order to insure their proper construction and fitting. Notes should be made of their effectiveness and needs for repair or revision. Observations on gait have proven to be valuable measures of the patient's recovery when accurately recorded. The recording of weight and measurements often predicts the development of some deformity, especially of the lower extremity. While all children grow, those on forced inactivity frequently become obese, thus giving more work to a muscle whose reserve strength has been lost through poliomyelitis.

X-rays, photographs, and movies are of great value. Plaster molds of deformed feet have been extremely helpful in preoperative and postoperative studies.

Probably one of the most confusing things about reviewing old charts is the startling array of terms coined to describe the same phenomenon. We feel that there is need of a glossary to assist physicians in more accurate and commonly understood descriptions.

SUMMARY

1. Review of 130 cases of poliomyelitis involving 997 muscles below the knee indicates that examination of such muscles done six to ten weeks after the onset of the illness has definite prognostic value if they fall into the base O and T or base G and N groups. They are of less reliable prognostic value if they fall into the base P and F group. It is to the latter group that we owe the most intensive efforts of the physician and physical and occupational therapists.

2. Little power is gained by base O, T, P and F muscles after one year from the onset of polio. Base G and N muscles complete the major portion of their recovery by the end of nine months. Thus, if corrective surgery to the leg and foot is contemplated, 12 months after the onset would appear to allow sufficient margin of safety to exclude the possibility of late recovery.

3. After having its insertion transferred, a muscle will probably lose from one to two grades of power. This should be taken into account when a surgical procedure to correct weakness or imbalance is contemplated.

4. The muscle testing procedure studied cannot be considered entirely adequate for all muscles. This is due to its subjective nature and the inaccuracy of testing normally strong muscles with less strong ones. This is particularly true

of G to N muscles of locomotion and weight bearing. However, it appears to be the best method available and our best hope of progress lies in its refinement and amplification.

5. More complete records are needed for both muscle examinations and progress notes. The lack of universal terminology imposes a burden upon others reading such records.

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Physical Therapy in Ancient China

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At first glance, the diverse fields of Chinese history and physical therapy seem to have little in common. Upon investigation, appearances prove deceiving, and an interesting story emerges about the use of water, exercise (including emphasis on breathing), and massage by the Chinese.

When one considers that the Chinese have been credited with the first knowledge of the circulation of blood, the early use of anesthetics, and a form of smallpox innoculation as early as the twelfth century, it does not seem surprising that they would be aware of the therapeutic use of physical agents. Although the methods then employed were scarcely those of the physical therapist of today, in many cases there seemed to be good reasons for their prescription, and understanding of the effects produced.

A brief consideration of a few basic premises of Chinese medicine will serve to partially explain why the use of physical agents was a natural development. Early medicine was closely related to the religious belief in the Yin and Yang and the Five Elements. The Yin and Yang are two basic interacting elements from which the universe evolved. They are endowed with innumerable qualities of an opposite nature, and all happenings in nature and human life are supposedly conditioned by their constantly changing relationship. They are in perpetual flux, but rather than opposing each other, each one is equally necessary to maintain balance and harmony. It is also believed that all things are made up of five elements and combinations of these elements, which are active principles successively overcoming each other.

These ideas form an integral part of medical theory. Perfect health, it is believed, can exist only when the two principles of Yin and Yang remain in perfect equilibrium. Disease is attributed to a lack of balance between Yin and Yang, and imbalance brought about by rebellion to the laws of nature. It is only when these vital forces of the body are in mutual agreement that a cure can be effected. The Yin and the Yang represent interacting principles of nature, such as heat and coldness, dryness and moisture, light and darkness, action and inaction. Thus, if a Yin principle, such as coldness, appears to be overbalancing the Yang, therapeutic measures would be aimed at restoring harmony of equilibrium between them and, in this case, heat might be employed.

A concordance is also established between each of the elements and the tissues. For instance, the skin and bones are identified with Yin and the ligaments and the arteries with the Yang. There are also fixed relationships in categories of five. Thus, heat injures the heart, and cold injures the lungs; an excess of pungent flavor knots the muscles, and an excess of sour flavor toughens the flesh. One discovers that wind is injurious to the muscles, but heat and drought counteract the wind, while the sour flavor is injurious to the muscles, and the pungent flavor

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This paper was written while Miss Koster was a physical therapy student at the University of Pennsylvania, Philadelphia.

counteracts the sour flavor. An intricate method of diagnosis and treatment based on these concordances and their interactions has evolved. Even today, some physicians determine what the cause of the imbalance leading to disease is, and then treat it according to the elemental principles.

In the light of these concepts, it seems reasonable to surmise that the physical agents of heat, light, cold, and moisture would be used in bringing about a balance in Yin and Yang. For a people living in close harmony with nature, the therapeutic use of instinctive reactions in treating disease and pain would seem logical. In fact Hume believes that China's unique contribution to medicine is the fact that it has brought to the attention of the world procedures of practical value, making much of physical therapy.

The physical means by which the early Chinese treated disease were varied. Before dealing with those methods clearly recognized as physical therapy, mention should be made of two other widely used physical methods: moxa and acupuncture.

Moxa, or moxibustion, is an ancient method still in use today. A soft mass of Chinese wormwood or a similar substance is used as a cautery by burning the substance on the skin. Moxa is based on heat, the nature of Yang, and is recommended in all diseases which are caused by excesses of Yin. It is curious to note that moxa relieved some victims of the atom bomb blast in Hiroshima when Western methods failed. Clinical research has shown that moxa has an influence on the blood chemistry.

Acupuncture, or "needling," was a highly developed skill involving the puncture of body tissue in specific areas with varying sizes and kinds of needles. Then used to restore equilibrium between the Yin and Yang, it is now considered in some quarters to be of clinical value in the relief of pain of the arthridities.

Massage is the third of the three typical ancient Chinese methods of treatment, along with that of moxa and acupuncture. The Chinese early utilized this instinctive reaction for the relief of pain and for sedation by evolving the curative system of massage, and they developed it to a high degree of excellence.

In early texts are found descriptions and suggestions for treatment by massage, such as these:

> "The people of the regions of the center . . . their diseases are many; they suffer from complete paralysis and chills and fever. These diseases are most fittingly treated with breathing exercises, massage of skin and flesh, and exercises of hands and feet."
>
> "When the body is frequently startled and frightened, the circulation in the arteries and veins ceases, and disease arises from numbness and the lack of sensation. In order to cure this, one uses massage and medicine . . ."
>
> (Veith translation)

It is also said that in the time of the legendary Emperor Huang Ti, who supposedly lived more than two thousand years before Christ, Wu Fu employed manipulation, baking and radical excision in the treatment of disease. The *History of Pien Ch'iao* states that "Wu Fu healed diseases not by making decoctions of medicine but by scattering or sprinkling alcohol on the body, by pressing of parts (massage) . . ." (Morse) Pien Ch'iao recommended massage for fatigue, lumbago, rheumatism, nervous diseases, insomnia, headaches, and certain forms of paralysis. Mencius, the famous philosopher who died in the third century before Christ, alludes to massage, and in the *Annals of Art*, a treatise of ten volumes, massage is mentioned.

The value of massage was fully recognized in the T'ang dynasty, from the year 618 to 906 A.D., when it was elevated to a science, forming one of the seven departments of medicine. Masseurs were considered as doctors along with physicians, acupuncturists, and exorcists. A special chair was established, with a "po shih," or learned one, in charge of the department of massage. According to the *Official Repertory of the New T'ang Annals*, the Imperial Medicine Bureau was so arranged that the Department of Massage had one Professor of Massage with three masseurs, who gave lessons in physical exercise, and treated cases of fractures, other injuries and wounds.

In addition to massage, hydrotherapy was also known early in China, and some attribute its origin to the Chinese. That there was knowledge of the beneficial effects of water is indicated in the following exerpts from early works translated by Ilza Veith:

> "In order to cure every heat disease, one should first prescribe potions of cold water and then acupuncture."
>
> "One can repress the evil influences of the spleen causing hunger, weakness, burning sensation in the stomach and yellow complexion by administering drugs and one can apply baths."
>
> "For numbness with swellings and pain brought about by the evil winds, one must apply hot liquids and hot irons and finally resort to fire, which is used in burning moxa for cauterization."

According to Dr. Wong, a historian of Chinese medicine, the earliest record of the use of water was in 178 B.C., when King Chuan suffered from fever, headaches and oppression of the chest. Ts'ang Kung applied cold water to the head, made three punctures on each foot and the symptoms disappeared. In the later Han dynasty, which ended in 220 A.D., Dr. Wong notes that Chang Chung-ching, the Hippocrates of China, also employed cold baths to reduce fever. This antipyretic treatment of fever by cold baths antedates James Currie's methods by almost 1,700 years.

Hua T'o, a contemporary of Chang Chung-ching and Ts'ang Kung, is considered as the pioneer in the field of hydrotherapy, although he is also famous for his discovery of anesthetics and for his surgical skill. An instance in which he applied it with marked success in a case of long continued fever is recorded for us in *A History of Chinese Medicine.*

> "In spite of the cold weather, he caused the patient, a woman, to sit inside a stone trough and ordered his assistants to pour one hundred bucketfuls of cold water over her. When only seven or eight buckets had been emptied, the patient shivered so violently that his assistants wanted to stop. Hua T'o, however, insisted on giving the full number. After about eight bucketfuls, vapour began to appear which gradually rose to two or three feet around the patient's body. The hundredth bucketful poured, Hua T'o then lighted a fire to warm the bed for the patient who was heavily covered with quilts until a thorough sweating ensued."

Dr. Wong dryly observes that the patient recovered under this heroic treatment. Hua T'o also employed continuous hot fomentation for the bite of a poisonous insect.

A similar treatment is recorded in a much later dynasty, the Chin, when Ke Chien-sun employed the then rare method of hydrotherapy on a student suffering from typhoid and who did not perspire. The patient had become delirious and ran along the bank of a stream. Ke Chien-sun immersed him in the cold water for a long time, then wrapped him in cotton quilts. After this, the patient perspired and recovered.

Another important method of treatment was that of exercise. An early proverb of Wu Linyeh's "Prolonged inactiveness causes flabbiness of the muscles as well as weakness of the heart," reveals that the Chinese understood the benefits of physical exercise. In the *Spring and Autumn Annals,* of a few centuries before Christ, the observation is found: "Running water will not become stagnant; the used doorstep will not rot; the human body, if exercised, remains healthy." (Morse)

According to Hume, the symbol of the development of physical therapy in China is the legendary Huang Ti, who used massage, moxa and graded exercise, as well as visits to hot springs and mountain sanatoria for treatment by rest and sunlight. However, the first concrete mention of the actual use of physical exercise by a physician is in connection with Hua T'o.

Hua T'o, an exponent of systematic exercise and the inventor of a system called the "frolics of the five animals," shows a basic understanding of the role of exercise in human health. In a lecture to one of his disciples, he fully explained his belief in its values.

> "The body needs to work; when it is in motion, the bad air is expelled from the system, the food is digested, and the blood circulates in the arteries in all directions, so that no disease can appear. The used doorstep never rots, so it is with the human body. Hence it is that the immortals of ancient days, performing the inhalation system, and passing the time as dormant bears, looking around as owls, twitching and stretching their limbs and moving the navel gates and their joints, hindered the advance of old age. I have a system of exercises called the frolics of the five animals, which are, a tiger, a stag, a bear, a monkey and a bird, by which illnesses can be cured and which is good for the movement of the feet, when they accompany the inhaling process. Whenever you feel unwell, stand up and perform the movement of one of these five animals; when you feel more comfortable and in a perspiration, put rice powder on your body, and you will presently feel quite nimble and well and you will have a good appetite." (Morse)

The art of physical exercise was further specialized in the religions of Taoism and Buddhaism. In an effort to obtain immortality, a comprehensive regime of mental and physical discipline, with the development of an elaborate system of proper breathing, diet, physical exercise and mental training, was undertaken. Those imbued with the religious spirit of Taoism believed that in this manner the grosser elements of man's nature might be refined and immortality obtained. One Taoist invented a series of physical exercises, consisting mostly of positions or postures in which it was necessary to sit or stand, sometimes for an hour or so at a time, in the hope of prolonging life. That the Buddhist also advocated exercise can be seen in their concept of a "sound mind in a sound body." The Bodhidharma says: "Without health one cannot have good circulation and breathing. Hence the body should be properly exercised

so that the muscles and tendons may be supple and the spirit will not then suffer from the misery of weakness." (Wong) Out of the Buddhist psychotherapeutic methods, there also arose the art of meditation, a system of graded mental exercises which aimed at developing the mind into a state of mental repose or relaxation.

Proper breathing was emphasized, and it was developed into a highly cultivated and intricate practice by the Chinese. An early advocate notes that "When the body is in distress but the will and ambition are gratified and happy, disease arises from the muscles; and in order to cure it one uses moxa and breathing exercises." (Vieth) Huai Nan Tzu, who lived more than a century before Christ, observed that deep breathing cleared the intellect and prolonged life, and he believed that consuming the atmosphere enabled man to become more spiritual and to attain extreme old age.

The detailed development of breathing during the Han and later dynasties came largely as a result of the influence of a popular, magical off-shoot of philosophical Taoism, which concerned itself with self nurture, and centered around efforts to gain immortality. These Taoists believed in the intimate rapport of the soul and the breath. Proper breathing, or "lien ch'i," means transmuting the breath into soul substance or vital essence from the air. The art of deep breathing is one solution to the problem of attaining Tao, or the way of man, the principle of the universe.

One of the philosophers of Taoism, Chuang Tzu, stated the "blowing and gasping, sighing and breathing, expelling the old breath and taking in the new: Passing time like the dormant bear, and stretching and twisting the neck like a bird —all this merely shows the desire for longevity." (Wong) Rather detailed instruction in this art is given by Pao Po-tzu:

> "In the beginning to learn the proper use of the breath, one should inhale a breath through the nose, stop up the nose, and mentally count one's heart beats. When one has counted to one hundred and twenty beats, the breath should be exhaled through the mouth. In this method of breathing, everyone should make it his aim that his own ears might not hear the sound of either exhalation or inhalation. The rule is to inhale generously and exhale sparingly. One should suspend the feather of a wild goose in front of the nose and mouth. That the feather might not stir while the breath is being expelled, should be one's aim. With gradual practice, one should increase correspondingly the count of heart beats during which the breath is held. After a very long period of time, one should be able to count one thousand heart beats. When an old man has arrived at that stage, then he will be transformed into a young man—each day adding to the transformation."
>
> (Wong)

In the effort to obtain eternal youth and to find the formula for immortal life, Taoism became more corrupt and evolved even more detailed instructions. For instance, to be done correctly, breathing in the spring was to be done facing east, in the fall, facing west, in the winter, north, and the summer, south. However, as Giles pointed out, there is perhaps more to be said for this system of deep breathing than there is of another Taoist practice of swallowing the saliva three times in every two hours, to attain immortality.

Although many of the methods employed by the early Chinese seem strange and far-fetched to us now, it is possible to see some continuity between some of their practices and ours of today. As in other fields in which the West has gained technical supremacy, the Chinese did have the earlier knowledge, but they failed to develop it to the fullest extent. It is interesting to discover that some of the roots of the means we utilize today for the treatment of physical disabilities are to be found in the practices of the Chinese centuries before the era of Christ.

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Suggestions from the Field

A Wheel Chair Specification Form

Erbert F. Cicenia, Ed.D.

The wheel chair specification form presented here was developed after five years of temporary trial-and-error use in mimeographed form by the staff of the Physical Rehabilitation Section of the New York State Rehabilitation Hospital. Many revisions of the original format were made resulting in the present, acceptable form.

The basic purpose of the wheel chair specification form is threefold:

1.) To provide a concise, simple work sheet for evaluating a patient for a proper wheel chair. An attempt has been made to include the types of wheel chairs, convenient aids, and accessories most commonly used in the treatment and functional training of the various disabilities of the locomotor system.

2.) To provide a concise, accurate, written prescription for a wheel chair, so that there can be no possibility of misunderstanding or confusion on the supplier's part as to the exact type of wheel chair or accessories desired.

3.) To provide for the patient's hospital chart a record of the physician's prescription including the type of wheel chair or accessories recommended and received, and the name of the supplier. In addition, the wheel chair specification form affixes responsibility for alterations, additions or inadequacies which may lead to later dissatisfaction.

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In using the form, it should be noted that all items recommended are ordered by placing a check mark or "X" in the appropriate space. Ample space is provided for items not included on the form. When a measurement is involved, it should be further noted that instructions have been included for properly fitting the items to the specific body measurements of the patient. In such instances instead of a check or an "X", the measurement in inches should be entered in the space provided.

It goes without saying that the wheel chair specification form is only offered as a suggestion. The form is useful for one particular institution and can be easily modified to meet the specific needs of other institutions, or other functional training programs. Such items as hospital or clinic number or diagnosis, can be added, substituted, or interchanged with other variable items. In a similar manner, such items as chain drive, lever drive, glideabout, or commode chair, can be added or changed, if a particular institution finds it has a need for this type of information instead of some of the special items included on the form.

SPECIFICATION FORM ON OPPOSITE PAGE →

New Publication on the Career of a Rehabilitation Counselor

The National Rehabilitation Association and the National Vocational Guidance Association announce publication of a new informative guide entitled "Rehabilitation Counselor Preparation." It has been designed to meet the needs of expanded counseling services. Those sponsoring training programs for vocational rehabilitation counselors have raised many timely questions which were discussed in a series of workshops supported by the above organizations and the Office of Vocational Rehabilitation. Their findings are reported in this publication.

Such queries as the following are answered: What is the job of the rehabilitation counselor? What is the scope and what are the limitations of his responsibilities? Under whose auspices should his training be planned and how long should it take? In what areas of preparation should he be competent? Does he need supervisory experience and in what institutional setting should he work?

This 78 page paper-bound book will be of interest to counselor trainers, prospective students, trainees and general guidance counselors. Purchase price is $1.00 per single copy, slightly less for larger orders. Correspondence should be directed to:

National Rehabilitation Association
1025 Vermont Ave. N.W.
Washington 5, D.C.

or

National Vocational Guidance Association
1534 O Street N.W.
Washington 5, D.C.

NEW YORK STATE REHABILITATION HOSPITAL, WEST HAVERSTRAW, NEW YORK
Department of Physical Medicine - Physical Rehabilitation Section

WHEEL CHAIR SPECIFICATIONS

OUTDOOR: Standard( ) Special( ) HConv( ) Junior( ) Adult( ) Tiny Tot: Hi( ) Lo( )
INDOOR: Standard( ) Special( ) HConv( ) Junior( ) Adult( ) Tiny Tot: Hi( ) Lo( )
ONE ARM DRIVE: Right( ) Left( ) AMPUTEE: No.1( ) No.2( ) No.3( )

ARM ACCESSORIES: Wooden Arms:( ) Upholstered Arms:( ) Utility Tray: {Regular( ) / Padded Armrests( )}

ARM MODIFICATIONS: Fixed Offset Arms( ) Detachable Arms( ) With locks: Pin( ) Snap( ) Flared Arms( )
Desk Arms: Fixed( ) Detachable( ) With locks: Pin( ) Snap( )
Special Arm Height: Distance From Seat Rail To Top Of {ARM( ) / Upholstered Arm( )}

BACK ACCESSORIES: Zipper Back: Center( ) Rt( ) Lt( ) Crutch Holder( ) Posture Panel( ) Slack Back( )
Detachable Back: {Dot-fastener( ) / Turn-buckle( )} Rt( ) Lt( ) Headrest Extension: {Hook-on( ) / Detachable( )}

BACK MODIFICATIONS: Reclining Back: {Full( ) / Semi( )} Raised Back: {Height: Distance From Top To Seat Rail( ) / Regular Push Handles( ) / Continuous Push Handles( )}
Hinged Back( )
Reinforced Back( )

BRAKES: Regular: Bilateral( ) Rt( ) Lt( ) Chain Locks: Bilateral( ) Rt( ) Lt( )
Extensions: {Solid: Bilateral( ) Rt( ) Lt( ) / Disjointed: Bilateral( ) Rt( ) Lt( )}

CASTERS: 5"( ) 8"( ) 8" Caster Pin Locks:( ) Tires: Regular( ) Pneumatic: Full( ) Semi( )

CUSHIONS: Seat Cushion:_____ Fabric Cover( ) Leatherette( )
Back Cushion:_____ Fabric Cover( ) Leatherette( ) Ring Cushion( )

FOOTREST MODIFICATIONS: No.2 Footrests( ) No.3 Footrests( ) Parallel Footrests( ) Plantar Flexion( )

HANDRIMS: Regular( ) Without Handrims( ) Special: Rubber Covered( ) Extended( )
Lugs: Horizontal( ) Vertical: Above( ) Below( )

HEELSTRAPS: {Hook-on type( ) / Slip-on type( ) / Heel Loops( ) / Toe Loops( )} 2"( ) 3"( ) 4"( ) Fabric Legrest Panel( )

LEGREST MODIFICATIONS: Elevating( ) Bolt-on Elevating( ) Upholstered Panel Pads( )
Swinging Detachable Footboards( ) Swinging Detachable Elevating Legrests( )

WHEEL MODIFICATIONS: Wheels: 20"( ) 24"( ) 26"( ) Extra Axle Sockets: 20"( ) 24"( ) 26"( )
Tires: Regular( ) Pneumatic( ) Black( ) Gray( )
Special Axles and Wheels( )

SEAT ACCESSORIES: Solid Seat Insert( ) Commode Seat( ) Width Control( )

SEAT MODIFICATIONS: {Lowered Seat( ) / Raised Seat( )} Height of Seat Rail From Floor( ) Special Depth: Seat Uphol( ) / Reinforced Seat( )
Special Width: Distance Between Arms( ) Chair Widened & Lowered By Uphol( )

SLINGS: Bilateral( ) Right( ) Left( ) Rancho( ) Right( ) Left( )

OTHER RECOMMENDATIONS_____

NAME:_____ DATE_____ PRESCRIBED BY:_____
ADDRESS:_____ COUNTY:_____
SUPPLIER:_____ MEASURED BY:_____
DATE RECEIVED:_____ EXAMINED BY:_____ ACCEPTABLE( ) REJECTED( )
MODEL #_____ SERIAL #_____

REASONS FOR REJECTION:_____

Editorial

The May issue of the *Review* contained a most provocative article describing physical therapy in Austria. This should be required reading for every member of our Association and particularly brought to the attention of anyone who is uncertain of the benefits derived from a strong professional organization. It is true that the things we possess are too often taken for granted and never fully appreciated until they are lost, but perhaps the worth of our position can be emphasized if we compare it to the decription of "professional life" found in this article.

Reviewing the status of American physical therapists and that of our Austrian colleagues reminds us vividly of the advantages which have resulted from the steady development of our professional abilities coupled with organized advancement of the field in such areas as service to patients, education, interprofessional relations, and ethical standards. All of these, please note, have been declared objectives and active programs of the APTA for the past thirty years. No one doubts the worth of the results, although we may fail to realize that each step required diligent work and unfailing devotion to duty, and did not "just happen."

It is interesting to reflect on what our profession might have been without the intelligent guidance and foresighted planning that organized effort has obtained. It is often stated that one of the most significant stages of our growth occurred during World War II. Membership figures, numbers of approved schools, and increases in student enrollment all testify to this. But a fact that is often overlooked is that this growth was possible because there was a sound foundation on which it could be based, and because, despite a national emergency, this well-rounded professional organization could control and direct expansion to insure attainment of its objectives.

Recently there has been a tremendous increase in the demand that our profession play a prominent part in the total rehabilitation of the handicapped. No one can doubt the present importance and the future scope of this area of medical care, nor its importance to our own development. Physical therapy has been challanged to accept responsibilities in this area and, because the profession was well or-

Editorial

ganized, has been able to meet these demands. How different the picture might have been without those many years of Association activity.

The important part played by physical therapists in the total program leading to the use of the Salk vaccine for poliomyelitis is well known. What is perhaps overlooked is the intricate mechanics of organization which laid the groundwork for their contribution. Such benefits and opportunities, *which directly and indirectly help every physical therapist*, were possible only because of our firmly established professional association.

It is clear, as we analyze our present status that there are many advantages and achievements which have occurred only because of concerted effort on a national basis. Human nature is such that we forget, many times, to fully appreciate the achievements and impatiently concentrate on criticisizing those problems not yet solved. But more serious is the tendency to accept the present level of development as final and fail to appreciate our responsibilities to insure the future. What we enjoy today was secured only because of the efforts of those before us in establishing and maintaining a sound foundation. It came about only because of individual and group effort, planning, and *active participation* in Association activities. Our responsibility is the future and we must meet it today.

National Society Annual Meeting To Be Held in Washington, D. C.

For the first time in its 35-year history the National Society for Crippled Children and Adults will hold its annual convention at the nation's capital in 1956, it was announced by Dean W. Roberts, M.D., executive director.

The four-day meeting of the National Society, also known as the Easter Seal Society, which will be held Oct. 28-31 at Washington's Hotel Statler, will highlight speeches by notable authorities in rehabilitation and feature displays of newest appliances for crippled children and adults.

Among the tentative plans for the convention are a luncheon to bring together specialists from governmental and private agencies who work with the handicapped; a pageant on "Progress in Protheses and Appliances," displaying wheel chairs, crutches, braces, artificial prothesis and other equipment from 1906 to 1956; a demonstration by the District of Columbia Society for Crippled Children showing its clinical, therapy, and education program, special tours of the nation's capital city, and a tea at one of the Washington embassies.

Walter Blount, M.D., immediate past-president of the American Academy of Orthopaedic Surgeons, is among the principal speakers already scheduled for general sessions planned during the mornings of the convention. Afternoons will be devoted to workshops, seminars, and institutes covering many phases of rehabilitation.

James B. Johnson, M.D., prominent physican and surgeon of Newark, Ohio, and member of the National Society's executive committee, is chairman of the 1956 convention.

New Student Members

Albany Hospital
Lenita McClaren

Columbia University
Natalie Seidner

University of Connecticut

Bradley L. Allen
Nancy Anderson
Barbara Baier
Maureen Dougherty
Mary Jack
Mary Jane Laffan
Margaret Ann Manion
Jean Van DeWater
Margaret R. Young

University of Minnesota

Susan Johnson
Clair LeCaptain

Association Activities

Marriages

Pauline Ase, of Chicago, Ill., now Mrs. Pauline A. Takehara, Chicago.

Anna L. Barnhart, of Baltimore, Md., to B. W. Dunning, Jr., College Park, Md.

Dorothy A. Bell, of Ann Arbor, Mich., to Mark Luedi, Dexter, Mich.

Ruth E. Bell, of Grand Rapids, Mich., to Stuart Kutsche, Grand Rapids.

Suzanne Bemis, of Seattle, Wash., to Philip C. Packard, Seattle.

Rita Bridenhagen, of Chicago, Ill., now Mrs. Rita B. Martel, Chicago.

Barbara G. Brownell, of Fort Ord, Calif., to Osmund H. Webster, Pacific Grove, Calif.

Diane E. Bullivant, of Portland, Ore., to Richard W. Graham, New York, N. Y.

Diane Charleson, of New York, N. Y., now Mrs. Diane C. Kelley, Waltham, Mass.

Rosemary A. Cotton, of Syracuse, N. Y., now Mrs. Rosemary C. Moll, Syracuse.

Margaret Dahm, of Los Angeles, Calif., now Mrs. Margaret D. Dane, Los Angeles.

Carol Daly, of Corte Madera, Calif., now Mrs. Carol D. Crook, Corte Madera.

Arlene Faigenbaum, of Troy, N. Y., now Mrs. Arlene F. Schermerhorn, Albany, N. Y.

Margaret J. Galbraith, of Muncie, Ind., to W. Pete Anthony, Muncie.

Constance Gibbs, of Newton, Mass., now Mrs. Constance G. Oliver, Boston, Mass.

Beverly J. Graff, of Galveston, Tex., to Ralph H. Daugherty, Jr., Austin, Tex.

Helen R. Hazen, of Miami, Fla., now Mrs. Helen H. Russell, Selah, Wash.

Jewell Heckrotte, of Chicago, Ill., now Mrs. Jewell H. Flecksig, Chicago.

Elizabeth Hentschel, of Grand Rapids, Mich., now Mrs. Elizabeth H. Negrycz, Berkeley, Mich.

Margaret Henze, of Melrose Highlands, Mass., to Howard Adams Davis, Melrose Highlands.

L. Aileen Hewstone, of Racine, Wisc., to George Waltz, Racine.

Lydia Jacob, of Long Beach, Calif., now Mrs. Lydia J. Bayne, Mystic, Conn.

Eleanor Lamb, of Middletown, Conn., to John A. Bernier, Brookline, Mass.

Martha E. Lamberson, of Indianapolis, Ind., to Marcene Pearcy, Presidio San Francisco, Calif.

Gretchen Mars, of Charlotte, N. C., now Mrs. Gretchen M. Howerton, Charlotte.

Olga M. Mocher, of San Francisco, Calif., now Mrs. Olga Rasmussen-Taxdal, San Francisco.

Martha J. Osborn, of Denver, Colo., to Howard E. Netz, Denver.

Sonia Parker, of Brookline, Mass., to Dean S. Davis, Brookline.

Thelma E. Peirce, of Kauai, Hawaii, to Carl W. Johnson, Oahu, Hawaii.

Eunice Perry, of Buffalo, N. Y., to Ange S. Naples, Buffalo.

Geraldine A. Psciuk, of Detroit, Mich., now Mrs. Geraldine P. Faust, Detroit.

Helen Regan, of New York, N. Y., to Reginald H. Brenner, Flushing, N. Y.

Marilyn Ritz, of New Albany, Ind., to Ernest C. Meyer, New Albany.

Norma E. Ripanti, of Hopedale, Mass, to Howard E. Thurston, Lynn, Mass.

Jacquelyn Robbert, of New Orleans, La., to Frank J. Stich, Jr., New Orleans.

Dorothy Schmugge, of Chicago, Ill., now Mrs. Dorothy S. Durkin, Chicago.

Mary Ann Schrader, of St. Louis, Mo., to Richard E. Welling, Berkeley, Mo.

Jane Smith, of Boise, Idaho, to Richard J. Mason, Boise.

Rita Talavera, of San Juan, P.R., now Mrs. Rita T. Taylor, San Juan.

Nancy Lee Talley, of Dallas, Tex., now Mrs. Nancy T. Bailey, Dallas.

Nancy White, of Billings, Mont., to Roger Tunnicliff, Forsyth, Mont.

Jean M. Wilson, of Seattle, Wash., now Mrs. Jean W. Stone, Demarest, N. J.

World Confederation for Physical Therapy

New Contributions (as of June 11)

Virginia Reichenbach	$ 1.00
Central New York District	50.00
Eastern New York District	50.00
Southern Tier New York District	11.00
Virginia Chapter	7.00
Nevada Chapter	4.00
North Dakota Chapter	14.00
Northeastern Ohio District	12.00
Nebraska Chapter	25.00
Southern California Chapter	10.00
District of Columbia Chapter	13.37
Alaska Chapter	10.00
Betty Henthorn	2.00
West Tennessee District	10.00
Greater New York District	600.00
The Burdick Corporation	200.00
American Academy of Orthopaedics	100.00
National Foundation for Infantile Paralysis	7,500.00

Total to date: $14,886.91

New Endorsing Organizations

American Congress of Physical Medicine and Rehabilitation

World Federation of Occupational Therapists

Letter from Korea

The following is a letter received from Thelma Maw, Association member who is with the Methodist Mission, Seoul, Korea.

DEAR FRIENDS:

It seems only yesterday that we were struggling to keep warm. We gave up trying to be beautiful when we started adding layer number 4. Now buds are bursting everywhere and the landscape is a blaze of color. Picnics and outdoor worship services are the new order of the day. We who are followers of Christ have a renewed awareness of the new life that is possible in Him.

Because I want to share with you some of the joys of Christian Service in Korea, I'll let you in on the ground floor—that's where I live. Gray House is a three story place with YWCA folks on the third, a Methodist couple on second and we WDCS'ers on the first floor with some bedrooms on second.

My work as a physical therapist and my teaching take me from the depths of the basement to the heights of the fifth floor of the hospital. It has lots of variety (whose hasn't) and I enjoy it. There is a real joy and satisfaction in working with people and for people.

Our patients range in age from 1½ months to 72 years. The tiniest is little Kyung Hi who had an injury at birth and has little use of her left arm. We see her daily and are giving her whirlpool, massage and exercises. Grandma—our oldest—had a broken hip and it is our hope that we can limber up the stiff joints now that the cast has been removed. I'm really the crazy foreigner when it comes to giving grandma exercises, for who but a foreigner would ask a grandma to exercise her left leg?

We see all kinds of patients. Many come as the result of poor medical care given earlier. Many are beginning to realize that help is available. This always gives us a thrill. We have been privileged to see seemingly paralyzed muscles flicker and come to life after days of hot packs. Then, little by little function returned and a child walked again. We believe that God can use us to perform miracles in this day that bring glory and honor to His name.

If you could have seen the little fellow who left the hospital Saturday, I'm sure that you would have felt as we did—grateful that God has called us to this land and has given us a work to do for Him. An Chang Geun came to the hospital about a month and a half ago. One of the missionaries out in a country station visited in a home and found a little fellow lying huddled on his mat with his knees and hips drawn up in pain. His face was chalk white and it was evident that he was badly undernourished. Arrangements were made for the child to be brought to Severance and he was admitted to one of the free wards and for a month and a half he received extra food—thanks to CARE boxes. Treatment consisted of hot packs and very gentle stretching. In less than a week's time you would not have guessed it was the same boy. Color had returned to his cheeks and a sparkle to his eyes. About a week ago he was allowed up for the first time and began taking a few steps. Last Saturday was the grand day when he said goodbye to nurses and friends and left the hospital for his home. He is only one of our family of patients who share with each other their sorrows and their joys.

We have a fine staff too and I wish it were possible for you to meet all of them. Perhaps that will be possible next time, if pictures turn out as they should.

Continue to remember us in your prayers for each day we are confronted with tasks which crowd us to Christ, for in Him alone is the answer.

Letters mean so much to us here. . . . We pine for a line!

Sincerely,
THELMA MAW

Elizabeth Q. Ammerman passed away on May 10, 1956 in Schenectady, New York, following a brief illness. Miss Ammerman, a graduate of Russell Sage College and the Medical College of Virginia, was most recently employed by the New York State Department of Health, Albany Regional Office. Previously she was on the staff at the Eastern New York Orthopedic Hospital in Schenectady; the New York State Rehabilitation Hospital, West Haverstraw, New York; and also served as a physical therapist with the 194th General Hospital Unit during World War II. Miss Ammerman had been a member of the Association since 1943 and was a member of the New York Chapter, Eastern District.

The Elizabeth Q. Ammerman Memorial Fund is being established by her professional friends and members of the physical therapy profession and will be given to a deserving Russell Sage College physical therapy student.

Student Section

Regional Student Editors

Region I—Editor Audrey Haugaard—Simmons College
University of Connecticut
Boston University
Bouve-Boston School
Simmons College
University of Pennsylvania
The D. T. Watson School

Region II—Editor Joan Erback—New York University
Columbia University
Albany Hospital (Russell Sage College)
New York University
University of Buffalo
Frank E. Bunts Educational Institute
Walter Reed Army Hospital (May-Sept.)

Region III—Editor Marcia Field—Med. College of Virginia
Medical College of Virginia
Charity Hospital of Louisiana
Duke University
Baylor University
Hermann Hospital
University of Texas
Medical Field Service School (Sept.-May)
Brooke Army Hospital (May-Sept.)

Region IV—Editor Carol Vacca—St. Louis University
Northwestern University
State University of Iowa
University of Kansas
Washington University
St. Louis University
University of Oklahoma

Region V—Chairman Gail E. Barrand—University of Wisconsin
University of Minnesota
Mayo Clinic
University of Michigan
University of Colorado
University of Wisconsin
San Juan, P. R.

Region VI—Editor Ronald E. Bell—Children's Hospital
Childrens Hospital
University of Southern California
University of California
College of Medical Evangelists
Stanford University
Letterman Army Hospital (May-Sept.)

Student Editor—Audrey Haugaard

This section of the *Review* is reserved so that students may have the opportunity to express and to share with others their ideas about the field of physical therapy. Each of the schools in the six regions is contacted by its regional editor once a year for a specific time when the schools of that region especially will be represented in the Student Section; but please feel free at any time to submit articles to your regional editor. The Student Section is here to reflect student life, work, and thinking; please do not hesitate to utilize this opportunity to express your ideas and to represent your school.

Sincerely,
AUDREY HAUGAARD
Student Editor

Physical Therapy Course

Army Medical Service School

The profession of physical therapy is a primary objective of our learning experience at the Army Medical Service School. However, a single day spent at this school exposes one to all kinds of persons, their interests, idiosyncracies, and activities. It is not too difficult to imagine how many varied topics of discussion may arise during the course of an eight-hour daily program, even though our schedule may read "Lower Extremity," "Physiology of Exercise," or "Goniometry." Knowledge based upon experience and conveyed to us by most competent instructors, will inevitably lay the foundation for an education unsurpassed.

One can be sure our day is filled, with no idle moments to spare. A brisk drill around the quadrangle, directed between, through, and around on-coming troops, constantly reminds us that we are in the Army. Although it began as mere routine, minus incentive, it has become a distince challenge of which we are proud to be a part.

One phase of training not printed on the schedule, yet excelled in by all, is the "quick-change-artist" routine, sometimes repeated more than once daily. . . . bathing suits for hydrotherapy, shorts and halters for therapeutic exercises, white gowns for electrotherapy. We not

only practice the administration of such phases of physical therapy, but we must also experience the feelings, attitudes, and reactions similar to those a patient undoubtedly experiences. Here again, personal confidence may be acquired in an effort to gain the confidence of the patient, knowing exactly what is happening to him, both physically and mentally.

Frequent inspections of our practice clinic necessitate orderliness and cleanliness, a prerequisite in the medical field. As Officer-of-the-Day, we each have the opportunity to proudly display our clinic.

That gnawing hunger pang tells us it's time for a quick lunch — quick only because we spend most of the time stealing a last glance at those physiology notes which may become quite important in that probable quiz. At this time, our social representative is usually occupied at a meeting where plans are discussed for an active social life, centered about the activities in the Officers' Club. The Physical Therapy Class recently sponsored an evening's entertainment and dance with all the gala trimmings of a wonderful holiday party.

Recurrent interviews with the head of the department, usually preceded by some activity within our sympathetic systems, always turn out to be a friendly chat, consisting of sincere encouragement, assurance of success, and heartwarming understanding of any problems that prevail. Such interviews usually serve to remind us that the "compulsory elective," recreation, is an integral part of our lives.

Along with the seriousness necessary for our intended profession, the informal attitude of Army Medical Service School educators instills in us the importance of a smile. We can always be sure that a student's comment, be it worthy, witty, or comical, will receive both attention and appreciation. More often than not, it will develop into a lesson for the day. For instance, when an uninhibited student decided to create innominate nerves out of colored straw and attach them intricately to the sacral region of the vertebral column of our skeleton, our instructor, knowingly, proceeded to demonstrate the importance of these nerves and requested more of the same ingenuity in the future. Similarly, it was pointed out how a simple droodle (meant to be the cross-section of a meatball!) could very well be the cross-section of the tibialis posterior!

As we are about to pass the midpoint of this 29 week didactic phase of training, our goal becomes more tangible. The dissembled pieces of apparent confusion begin to fall into a meaningful pattern. The integration of our courses provides an interrelationship of theory and practice in such a manner as to guide us toward this desired goal. Many hours of concentrated study, previously a task, are no longer a means to an end, but have become a hopeful challenge — an end in itself. So the days pass — lectures, note-taking, laboratory work, clinical application, coffee breaks, "To the Rear, March," and those long-awaited week ends. All too soon, the wonderful experience at Army Medical Service School will come to an end. Although we must leave the grounds and buildings, instructors and friends, we'll each take with us the memories that will then be so much a part of us. Our aspirations will become a reality, coinciding with the goals and ideals of other personnel engaged in rendering medical service.

JOSEPHINE MORELLI
Second Lt., AMSC
Brooke Army Medical Center

Report from Grady Vaughn School of Physical Therapy

To everyone's surprise, the boys out-number the girls in our class — a new trend!! Also, for the first time one of our girls is graduating from Baylor University with a degree in Physical Therapy. The rest are here under the certificate program. Thirteen of us are still "raring to go" after seven months of book learnin'. We've had our anatomy and physiology courses at Baylor Dental College. The rest of our courses were at Baylor Hospital.

In April we began surgical and clinical observation. Our two hours a week in surgery consisted mostly of orthopedic cases. Eleven hours a week we spent in the Physical Medicine Department here at Baylor. From the very beginning, however, our instructors arranged to bring patients to our classes and have us spend some time in the Clinic. To some this might seem unimportant, but students tend to lose sight of what they're working for if they aren't given a chance to see the results of the various physical therapy procedures. This also helps them gain an understanding of different pathological conditions, patient problems, and treatment.

Recently it has been brought to our attention that now, as we begin our clinical work, is the time to develop an aim and a philosophy about

our career in physical therapy. What is the primary aim of physical therapy, physical medicine, or any branch of medicine, but the welfare of the patient? Something for us to think about — do we like people — all people — enough that we will do everything possible to make them as physically independent and happy as is feasible? Can a physical therapist give the same high quality of service to each patient regardless of his personality, creed, color, and social background without this basic human feeling for people?

JOAN DYER, *Class of 1956*
Class Representative

Charity Hospital of Louisiana School of Physical Therapy

Charity Hospital originated in 1736 and was incorporated as an institution of the territory of New Orleans in 1811. In 1813 it incorporated as a state institution and in 1922, one hundred years later, a Department of Physical Therapy was organized to help meet the needs of the sick and disabled. Act No. 24 of the Special Session of the Louisiana Legislature in June of 1951 provided for the training of physical therapists. The School of Physical Therapy admitted its first class in September, 1952.

The School of Physical Therapy is located on the fifth floor of the Lapeyre-Miltenberger Convalescent Building. It includes a classroom, clinical laboratory, offices, and a study with departmental library. In addition, the classrooms and laboratory are well equipped with movie projector, skeleton, brain model, X-ray viewbox, anatomical charts, mirrors, exercise mats, and other apparatus needed for teaching the technical procedures of physical therapy.

We feel that we have an excellent school because we are situated at Charity Hospital and have a close relationship to the Medical Schools of the State University of Louisiana and Tulane University. Our school staff members are from the two medical schools, which we believe insures experience and training that are of the best.

The curriculum includes the applied sciences of anatomy, physiology, psychology, pathology, and neurology, the technical procedures of all the forms of physical therapy, orientation to physical therapy, and orientation to clinical medicine. This is followed by 24 weeks of clinical practice.

The school staff consists of Dr. Nathan H. Polmer, Medical Director; Miss Marjorie F. Martin, Technical Director; Miss Isadore Brown, Clinical Instructor; many clinical supervisors, and our Secretary, Mrs. Sophie Witty.

Eight students were graduated in 1953, eight in 1954, and nine in 1955. We are hoping to add four more to the list of graduates in 1956.

STUDENTS OF CHARITY HOSPITAL

Report from Duke University

On October 3, 1955, Duke University Physical Therapy Department welcomed 17 new students from 10 states and Norway. They quickly (??) became acquainted with the hospital, especially the kinesiology, anatomy, and physiology departments. The first social event came at the end of the first week, when the staff and senior class entertained the fledglings at a picnic. This provided an opportunity for the new students to meet the staff in an informal way.

Two months of study, and the class had a chance to reciprocate. Physical therapists from Duke, the Veterans Administration Hospital, and Cerebral Palsy Hospital gathered with the students to exchange gifts and laugh at three rounds of entertainment skits at the annual Christmas party. Santa, in the person of Gay Clark ('56), had a sore knee afterward, but everyone's wishes were fulfilled. A few days later, the senior class sported the honest-to-goodness full-fledged physical therapy emblems.

With the end of Christmas holidays, massage began. The students' enraptured expressions resulted from what they *heard* as well as what they *felt*, for Miss Rosemary Lane straight from London, England, taught this course, and the students responded to "Let's get on with it" and many other expressions. Hydrotherapy, neuroanatomy, electrotherapy, neurology, pathology, histology, and many other courses began in rapid succession. Journal Club, under the direction of Miss Helen Kaiser, Director of the Physical Therapy Department at Duke, prompts the students to spend profitable time reading current literature.

In January, members of the physical therapy staff were hosts to crisply uniformed (and trembling-kneed) students. The introduction to clinical application of class learning was gradual, and the necessary confidence with patients began to grow. In March small groups went to the Veterans Administration and Cerebral Palsy Hospitals, while hours at Duke were increased. A continuous tabulation of diagnoses of patients

seen and of physical therapy modalities prescribed is kept by each student, so the staff may arrange the future schedules to include as wide a range of experience as possible.

The class is looking forward to attending the Second Congress of the World Confederation for Physical Therapy in New York City in June. By the time this article appears in the *Review*, we hope to have met many of you there.

JANICE SMETANA
Class of December 1956
Duke University

Report from Richmond . . .

Arthritis Mobile Unit

In May, 1955, a club in Richmond gave a Mobile Unit to the Virginia Chapter of the National Arthritis and Rheumatism Foundation. The Unit consists of a station wagon with the necessary equipment to treat bedridden arthritic patients. Nancy Ellen Sickels, a '53 graduate of the Physical Therapy School, Medical College of Virginia, drives the Unit to the homes of her patients. Miss Sickels, or Rickey, as we know her, carries in the equipment, gives heat treatments, puts on adjustable braces, gives massage, or exercises wherever prescribed.

This spring, while exercising her dog, Rickey fell and broke both of her elbows. With her arms in casts, she solved her own problems. She managed to eat by attaching a fork to a long handled stick. She learned from firsthand experience the frustrating feeling of not being able to dress herself or do the million and one activities necessary for independent living.

During her convalescence, several physical therapists from the Medical College of Virginia kept the Unit running on a modified scale. Over fifty patients are on the schedule; some receive many visits a week, others weekly check-ups; and the waiting list is growing. Many Richmonders attribute their ability to walk without crutches or canes to the home treatments.

Rickey is back with the Unit now. Her work is one example of specialized physical therapy. Her patients include those with rheumatoid arthritis and osteoarthritis.

Rickey uses heat for relief of pain and muscle spasm, as heat is an analgesic or antispasmodic, infrared lamps for single joints, and bakers for larger areas. She also uses paraffin baths for the hands. To increase venous blood or lymph flow, she uses either sedative or stimulating massage. Direct massage over the joints is contraindicated, and only light massage is given when the joints are acutely inflamed. Exercises are prescribed to increase strength, endurance, coordination of muscles, and to correct and prevent deformities. For the latter, light weight splints are also used. She encourages systematic exercises, and discourages purposeless "wiggling."

Rickey instructs her patients in home programs of daily activities. She acquaints them with the nature of the disease and encourages them to participate in the setting and reaching of goals.

Rickey is one physical therapist who is devoting her time and experience to the treatment of arthritis. This is only one area where there is need for qualified therapists. Unlimited opportunities await future physical therapy graduates.

MARCIA FIELD
Medical College of Virginia

The Eyes of Texas

On October 3, 1955, nine eager students matriculated at Hermann Hospital to embark on a career in physical therapy. We did not realize what the coming year held in store for us or the amount of hard work which would be expected of each of us. The states were well represented with students from Louisiana, Mississippi, Montana, New York, Oklahoma, South Carolina, and Texas. Another distinction which proved to be most valuable was the fact that each of us held a college degree in such fields as biology, zoology, and physical education.

The first day we were welcomed and taken on a grand tour of the new Texas Medical Center. We were awed by its architectural beauty and the modern medical facilities.

The fall semester opened with the usual academic labs and lectures in anatomy, physiology, psychology, nursing, kinesiology, hydrotherapy, massage, ethics and terminology. For the spring semester, courses were scheduled in therapeutic exercises, electrotherapy, physical medicine and rehabilitation, pathology, neurology, medicine, orthopedics, and surgery. Of these subjects, everyone enjoyed massage, pathology, and surgery. Neurology proved to be the hardest, and anatomy involved the most study time, but no one seemed to mind, knowing its importance. A few hours of each week were spent in clinical observation in the Medical Center at Methodist Hospital, Arabia Temple Crippled Children's Hospital, and Hermann General Hospital — with a

month spent in occupational therapy. June marked the beginning of clinical affiliations at Gonzales Warm Springs Foundation in Gonzales, Moody State School for Cerebral Palsy in Galveston, the Veterans Administration Hospital and Hermann Hospital in Houston.

Besides the many hours spent in studying and classes, we were able to find some time for social activities including a student-faculty-staff picnic and swimming party.

The most important educational event staged was our television series of two days presented at the University of Houston, an affiliation of Hermann Hospital. The first program dealt with the medical aspects of physical therapy as a career and its place on the medical team treating the patient. The second day was a panel discussion by four of our students giving the students' view of physical therapy — curriculum, scholarships, affiliations, and the innumerable opportunities for jobs. Recruitment programs were presented on Career Day for high school and college students. The film "Within Your Hands" was presented on these occasions and was enthusiastically received.

We of the Class of 1956 shall look back on this year as memorable for friendships, unity, and cooperation. We are looking forward to the day when we will be allowed to wear the yellow and blue patch of the American Physical Therapy Association and the pin, identifying us as members of the professional team of therapists. We would like to express our gratitude and thanks to our Medical Director, Oscar O. Selke, Jr., M.D.; our Technical Director, Mrs. Cecelia J. Lee; the medical staff, staff members, our affiliating hospitals, and all others who had a hand in preparing us for physical therapy careers.

LEONA SCHIFANI
President, Class of 1956
Hermann Hospital

Regional Editor Honored

Joan Ruth Erbach has been awarded the Alumnal Key Award as the most outstanding senior woman in the School of Education, New York University. The selection was made from approximately 200 students and was based on performance during the four undergraduate years, including both academic record and leadership in student activities. In addition to that honor, Joan has also been elected to Pi Lamda Theta, the honorary society in education.

Miss Erbach is student editor of Region II.

Editorial

There is a constant temptation for all of us to "take it easy" when nobody is checking up on us. How many of us put off studying until the weekend, or say "We probably won't ever have to know this!" Skimming the vast, changing knowledge of physical therapy and neglecting to do spare time research and reading, seem unimportant now. But, along comes the big test or time to treat a patient, and we may find ourselves sadly lacking in knowledge or technic. Unless we are willing to accept the responsibility of training our minds and skills, we will not have the necessary confidence in our ability to apply our knowledge. The realization that we will be responsible for the care and rehabilitation of our fellow human beings should be foremost in our minds.

Make the most of these precious few years in physical therapy school by keeping your minds active and open to new ideas and technics.

MARCIA FIELD
Medical College of Virginia

Polio Living

Polio Living is a new pocket-size quarterly publication which is published and edited by persons who have had poliomyelitis. The magazine features ideas for easier living, information helpful to securing employment, ideas for hobbies, success stories and other valuable information. The first issue, Summer 1956, has 15 pages and is available to all persons who have had poliomyelitis.

Physical therapists may secure a free copy for each of their patients by either sending a list of the patients' names and addresses to the publisher, or a bulk supply may be obtained by a request submitted on the department letterhead. Requests should be addressed to Polio Living Magazine, 12 Ryan Drive, Bloomington, Illinois.

Correction

The address of one of our technical exhibitors at the Second World Congress was incorrectly listed on page 413 of the June *Physical Therapy Review*.

H. G. Fischer and Co. are in Franklin Park, Illinois.

Physical Therapy Programs—1956

APPROVED BY THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS OF THE AMERICAN MEDICAL ASSOCIATION

Schools offering the four year program leading to a baccalaureate degree will accept high school graduates, *as well as transfer students.* Schools offering the 12 to 16 months program leading to a certificate will accept students who have completed all or most of their undergraduate work providing they meet certain course requirements. Recipients of a degree or certificate have equal professional recognition and status. For specific information regarding each school's entrance requirements, tuition, and other fees, please write to the director indicated below. All students should investigate course requirements *early.*

	Degree	*Certificate*
CALIFORNIA		
Mrs. Mary J. Dodge School of Physical Therapy Childrens Hospital Society 4614 Sunset Boulevard Los Angeles 27		†
Mr. R. William Berdan School of Physical Therapy College of Medical Evangelists 312 N. Boyle Avenue Los Angeles 33	†	†
Mrs. Margery L. Wagner Curriculum in Physical Therapy University of California The Medical Center San Francisco 22	†	†
Miss Charlotte W. Anderson Department of Physical Therapy University of Southern California University Park Los Angeles 7	†	†
Miss Lucille Daniels Division of Physical Therapy Stanford University Stanford	†	†
COLORADO		
Miss Dorothy Hoag Curriculum in Physical Therapy University of Colorado Medical School Denver 20	†	†
CONNECTICUT		
Miss Frances Tappan School of Physical Therapy U 101 University of Connecticut Storrs	†	
ILLINOIS		
Miss Elizabeth C. Wood Course in Physical Therapy Northwestern University Medical School 303 East Chicago Avenue Chicago 11	†	†
IOWA		
Mrs. Olive C. Farr School of Physical Therapy State University of Iowa University Hospitals Iowa City		†
KANSAS		
Mrs. Ruth G. Monteith Section of Physical Therapy University of Kansas Medical Center Kansas City 3	†	†
LOUISIANA		
Miss Marjorie F. Martin School of Physical Therapy Charity Hospital of Louisiana 1532 Tulane Avenue New Orleans 12		†
MASSACHUSETTS		
Miss Shirley M. Cogland *School of Physical Therapy Simmons College-Children's Hospital 300 Longwood Avenue Boston 15	†	†
Miss Adelaide L. McGarrett Curriculum in Physical Therapy Sargent College, Boston University 6 Everett Street Cambridge 38	†	†
Miss Constance K. Greene Curriculum in Physical Therapy *Bouve-Boston School, Tufts College Medford 55	†	
MICHIGAN		
Miss Virginia Wilson Curriculum in Physical Therapy University of Michigan University Hospital Ann Arbor	†	†
MINNESOTA		
Mrs. Ruby M. Overmann Course in Physical Therapy University of Minnesota 860 Mayo Memorial Hospital Minneapolis 14	†	
Mr. Darrell D. Hunt School of Physical Therapy Mayo Clinic Rochester		†

* Accepts women students only.

	Degree	Certificate
MISSOURI		
Sr. M. Imelda, S.S.M. Course in Physical Therapy St. Louis University 1325 South Grand Boulevard St. Louis 4	†	
Miss Beatrice F. Schulz Department of Physical Therapy Washington University School of Medicine 660 So. Kingshighway Blvd. St. Louis 10	†	
NEW YORK		
Miss Dorothy L. McLaughlin *School of Physical Therapy Albany Hospital-Russell Sage College New Scotland Avenue Albany 1	†	†
Miss Mary E. Callahan Courses for Physical Therapists Columbia University College of Physicians & Surgeons 630 West 168th Street New York 32	†	†
Miss Elizabeth C. Addoms Physical Therapy Curriculum School of Education, New York University Washington Square East New York 3	†	†
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Abstracts

Weaning the Respirator Patient

Eva M. Pfeiffer and Mary Stevens, AM. J. NURSING, 56: 454-457, April 1956

Paralysis of the muscles of respiration does not mean that a patient must spend the rest of his life in a tank respirator. New devices and improved methods of care have made it possible for these patients to become much less dependent upon the tank respirator which almost completely restricts their activities.

Weaning the respirator patient is the process of gradually withdrawing mechanical breathing aids — either partially or totally. The key to successful weaning is to develop the patient's confidence in everyone who is concerned with his care, and to help him to establish confidence in himself.

The use of a cuirass respirator can be started early. All parts of the equipment should be checked and the pump adjusted so that the patient will be breathing at the same rate that he did in the tank respirator; the pressure should correspond to the tank pressure. The selection of the correct shell, the attitudes of the personnel working with the patient when he is transferred for the first time, and the methods of transfer are all important and are discussed.

After vital measurements have been made such as vital capacity, tidal volumes, and blood pressures, a weaning program is outlined. If, at this time, the patient has a vital capacity below 200 cc. he cannot be expected to breathe unassisted for any period of time. His periods in the chest respirator are increased daily and at the same time he learns to breathe unassisted for one to two minutes. During the first one or two weeks no more should be attempted.

When the patient has adapted to the routine of using the chest respirator and being moved to a bed, the rocking bed may be used. The rate at which the bed oscillates should be adjusted so that the patient will have the same number of respirations per minute that he had in the tank. The inclination of the bed should be adjusted to its extremes.

When the patient adjusts to the rocking bed, a schedule is set up so that he uses all three respirator aids daily. The patient is then permitted to gradually increase his periods of unassisted breathing, subject to an evaluation of his breathing ability. This is a continuous, slow process that is carried out for weeks and months. Fatigue and improper respiratory scheduling must be avoided.

Glossopharyngeal breathing is of considerable value and is discussed in the article. Supportive care is also of vital importance. Proper body alignment, exercise, and adaptive equipment are essential.

Six to nine months after the onset of the disease, a realistic plan usually can be made for the patient who has had extreme disability. The ultimate goal is not necessarily to wean all patients completely, but to help them to stay within their individual tolerance, short of physiological compromise.

Problems of the Aging; Conclusions Derived From Two Years of Interdisciplinary Study of Domiciliary Members in a Veterans Administration Center.

Ernest J. Fogel, et. al, AM. J. PSYCHIAT., 112: 724-730, March 1956

The complexities of society often create particular problems for older people; pressures, stresses, and denials make individual adjustment difficult.

Since the Veterans Administration Hospitals provide care for approximately 18,000 chronically disabled veterans, the program for the geriatric group is of considerable significance. A two year study at the Martinsburg (West Virginia) Veterans Hospital was undertaken. Answers to the following questions were sought: (1) What kinds of persons are in the domicile? (2) Why are they there? (3) What is the most effective program that will provide for better domiciliary life and later community living?

An experimental domiciliary group was compared with a matched community control group. Surveys were made which included educational, occupational, physical, and psychological levels and abilities.

There was a close relationship according to age, of health and physical ability in both the domiciliary and community groups. The degree and type of physical disabilities present were those expected for the age group. There was a significant difference between the two groups with regard to social and psychological factors. The typical domiciliary member's history was one of increasing social inadequacy, decreasing motivation and purpose, and progressive retreat into isolation and self-preoccupation.

These findings emphasized the need for integrated pre-admission planning and also the need for a coordinated recreational program. Individual guidance is indicated. This plan was carried out and proved to be practicable and effective for a more purposeful domiciliation and better socialization.

Severe Hypertension—Study of One Hundred Patients with Cardiovascular Complications

Paul D. White, J.A.M.A., 160:1027-1028, March 24, 1956

This study concerns the follow-up of 100 private hypertensive patients with cardiovascular complications. One half of the patients had undergone lumbodorsal sympathectomies in the years 1941 to 1946 and the others were treated by ordinary medical measures in the days before the use of diet and hypotensive drugs. Of the 50 sympathectomized patients, there was a total of 73 complications such as cerebrovascular accident, angina pectoris, and myocardial infarction. The 50 control patients were similar in regard to sex and age distribution, and had a total of 61 complications like those mentioned above. In both groups there was absence of any important degree of renal insufficiency which is a contraindication to the surgery.

In 1955, a follow-up of the control group, who did not have sympathectomy, showed that 48 of the 50 had died. Of these, 23 died from congestive heart failure, 15 from cerebrovascular accidents, 4 from myocardial infarction and 2 from coronary insufficiency. The mean survival time for the 48 patients was 3.7 years, and for all 50 cases was 4.1 years.

Of the 50 patients who were sympathectomized, 25 are dead. Six died of congestive heart failure, 9 from cerebrovascular accidents, and 3 from myocardial infarction. One died from coronary insufficiency, one from atrial standstill, one from arterial thrombosis, one from leukemia, one from cancer, one from euremia, and one of unknown cause. The mean survival time for these 25 patients was 6.1 years, and for the

entire 50 was 8.1 years. Of the 25 now alive, 20 are in good health and showed average blood pressures.

The ratio of longevity in the two groups is approximately 2 to 1 in favor of the sympathectomized group. It appears that lumbodorsal sympathectomy was more effective than routine measures of the day in prolonging life, improving health and reducing blood pressure.

Paralytic Supination Contracture of the Forearm

Michael Burman, J. BONE & JOINT SURG., 38-A: 303-312, April 1956

Supination contracture of the forearm, not uncommonly seen in Erb's palsy and occasionally seen in poliomyelitis, follows the selective paralysis of the muscles arising from the medial epicondyle of the humerus. These muscles are the pronator radii teres, flexor carpi ulnaris, palmaris longus, and the flexor carpi radialis. The supinatory muscles of the forearm, especially the biceps brachii, remain strong.

The supination deformity of the forearm is the primary link in a sequence of events which consists of a triple deformity of the shoulder in flexion, abduction, and medial rotation, a flexion contracture of the elbow, and hyperextension of the wrist.

The first step in correction is to return the shoulder to the neutral position. This must be done before correcting the supination deformity or the dorsiflexion of the wrist.

Operations used to relieve supination contracture of the forearm, especially osteotomy of the radius, are described in this paper. After section of the radius, there is dorsal and ulnar angulation of the radius by nonaxial torsion of the distal segment. The value of axial torsion osteotomy of the ulna to relieve supination contracture was noted.

Axon Sprouting in Partially Deneurotized Nerves

G. Causey and H. Hoffman, BRAIN, 78: (Part 4) 661-668, 1955

Partial deneurotization of a nerve and, therefore, partial denervation of a muscle can be produced experimentally and exists clinically. In the peripheral nerve, intact nerve fibers are in the same nerve bundle and in contiguity with degenerated nerve fibers. There has been reported in previous studies a technic of partial denervation which demonstrated sprouting of new nerve fibers from intact neurons to the denervated muscle fibers. The purpose of this paper was to determine if sprouting also occurs higher in the peripheral nerve and its root or trunk.

The studies were made on 35 rats. The sciatic nerve of the animal was partially deneurotized by section of the root of L-5. The sciatic nerve in midthigh and the tibial nerve below the knee as well as intact nerve roots L-4 and L-6 were studied. The nerve tissue was examined with the electron microscope.

There was evidence of degenerative changes occurring in 2 to 3 days after the nerve roots were severed. Also beginning early some progressive sprouting of neurotized neurons to empty neurilemma tubes was found. The sprouting consisted of a large number of very short nerve fiber branches, some below microscopic dimensions, packing in between the surviving myelinated nerve fibers.

With increasing time, the collaterals did not seem to mature markedly. The sprouting was evident in both the tibial and sciatic nerves. Collaterals were not seen in the roots of L-4 and L-6, supporting the contention that sprouting results only where close intermingling of degenerated and intact fibers occurs. It is probable that any portion of the neuron can sprout if presented with the appropriate stimulus.

Disturbances of Eye Movements as a Neurologic Problem

Carl F. List, NEW ENGLAND J. MED., 254: 461-464, March 8, 1956

The purpose of this article is to interpret common clinical syndromes of abnormal eye movements in simple neuroanatomic and neurophysiologic terms. It also points out the fact that disturbances of ocular motion follow the same general principles as those of other neurologic disorders of motion.

The innervation of eye muscles is compared with that of other striate muscles. The so-called lower motor neuron is formed by nuclei, roots, and peripheral fibers of the third, fourth, and sixth cranial nerves, in analogy to the spinal anterior horn cells, motor roots, and peripheral motor nerves. The activity of the lower motor neuron of the eye muscles is controlled by an "upper-motor-neuron" system in the brain stem and cortex. The function of this system is compared to that of the pyramidal and extrapyramidal systems. There is, however, a fundamental difference between the supranuclear control of eye movements and the supraspinal control of limb muscles. The innervation of eye muscles represents a closely coordinated pattern of linked binocular movements, whereas the motor innervation of limb muscles possesses a high degree of autonomy and flexibility.

The function of the neural network subserving eye movements is regulated by reflex impulses derived from various levels of the nervous system: visual, vestibular and kinesthetic-proprioceptive stimuli constantly activate, inhibit or modulate the peripheral responses. It is this close relationship with many other parts of the nervous system which explains the frequency with which lesions of the nervous system may affect eye movements.

The common clinical syndromes resulting from lesions of the peripheral neurons of the third, fourth, and sixth cranial nerves are discussed in the first part of the paper. The second part consists of discussions of the syndromes resulting from supranuclear lesions. These are divided into lesions of the brain stem, cerebellum, extrapyramidal system and lesions of the cerebral hemispheres. It is stated that neurologic analysis of abnormal eye movements frequently gives valuable information concerning both the localization and the pathologic anatomic nature of an underlying disease process.

Rheumatoid Arthritis in a Population Sample

J. H. Kellgren and J. S. Lawrence, ANN. RHEUMAT., DIS., 15: 1-11, March 1956

A sample of persons aged 55 to 64 years from an urban population was examined clinically, radiologically, and serologically for evidence of rheumatoid arthritis.

Clinical rheumatoid arthritis at all grades of severity was found twice as frequently among women, but the titre values in the sheep agglutination test were distributed equally between the sexes. Radiological evidence of rheumatoid arthritis was

also found equally in men and women.

In nine out of ten persons with severe clinical rheumatoid arthritis the diagnosis was confirmed by positive X-ray and/or agglutination test. With lesser degrees of clinical disease such confirmation became less frequent, and there were twenty persons with positive X-rays and/or agglutination tests among 283 who were considered to be free from clinical rheumatoid arthritis.

The prevalence rates ranged from 1 per cent for men and 3 per cent for women, with severe clinical rheumatoid arthritis confirmed by X-ray and serological test to 11 per cent for men and 27 per cent for women with all grades of clinical disease including a past history of polyarthritis. Precise diagnostic definition is therefore essential for the study of comparative prevalence rates in different populations.

Physical Performance and Growth in Children. Influence of Sex, Age and Intelligence

Erling Asmussen and K. Heeboll-Nielsen, J. APPL. PHYSIOL., 8: 371-380, January 1956

The influence of age, sex, and intelligence on the development of physical capacities in growing children aged 7-17 years was studied. By referring all the test results to body height it was attempted to separate qualitative differences and quantitative. This was made possible by a mathematically derived formula.

It was found that girls in some tests (e.g., respiratory strength, hand grip) were inferior to boys, but in others (vertical jump and strength of leg extensors) were practically equal to the boys. The sex differences found were most pronouced in the youngest children. The onset of puberty seemed to put an end to the increase of some physical capacities with height.

Age, beside influencing anatomical dimensions, seemed to have a positive influence on physical capacities, particularly in tests that required the highest degree of neuromuscular coordination. The age of puberty seemed to further increase physical capacities as related to body height in boys, whereas in girls it tended to decelerate the development of certain motor performances.

Intelligence, as expressed by the intelligence quotient (I.Q.) seemed to play no statistically significant role as long as the I.Q. was above 95. Boys with a lower I.Q. (average 83) on the whole performed less well than 'normal' boys.

Glossopharyngeal Breathing As An Aid to the Coughing Mechanism in the Patient with Chronic Poliomyelitis in a Respirator

C. I. Feigelson, D. G. Dickinson, N. S. Talner, and J. L. Wilson, NEW ENGLAND J. MED., 254: 611-613, March 29, 1956

It has been emphasized that glossopharyngeal breathing increases unassisted breathing tolerance and provides a more effective cough in patients with chronic poliomyelitis with impaired respiratory function. It is the purpose of this paper to demonstrate the effect of glossopharyngeal breathing on the peak expiratory flow in these patients.

Nine patients from the Poliomyelitis Respirator Center at the University of Michigan were studied. The patients coughed into a standardized pneumotachograph after an unassisted maximal inspiration and also after a glossopharyngeal breath. The peak expiratory flow was recorded by an amplifier and on an oscillograph. Vital capacities were measured and the pressure-ventilation relations (expressions of pulmonary compliance) were obtained from a previous study.

In each patient studied, it was found that a higher peak expiratory flow was obtained in a cough after a glossopharyngeal breath than in one after an unassisted maximal inspiration. The increase was greater in patients with the greater maximal glossopharyngeal breath. The relative increase was greater in patients with better pulmonary compliance. Glossopharyngeal breathing does not give the patients a normal cough but on the basis of these studies, it seems logical that ability to expel bronchial secretions would be improved.

A New Technique in Rhinoplasty

M. V. Bhajekar, ARCH. SURG., 72: 394-398, March 1956

Various technics of performing rhinoplasty have been attempted. Two of the more persistent problems after surgery are flattening of the nose and occlusion of the nostrils. The new technic described in this paper is aimed at preventing these difficulties. A pedicle skin graft is prepared so that the new nose retains its shape, size, and contour without the aid of any rigid support, and the nostrils remain open. The procedure has been performed successfully on 2 patients.

Preparation of the pedicle skin graft from the forehead and attachment to make a new nose is performed in several stages. Before surgery, a tin foil mold of the nose is prepared to help determine size and shape of the graft. In the first stage of surgery the pedicle flap is prepared with the free end attached to a light wooden board. The exposed area of the flap and the donor site are covered with Thiersch grafts from the thigh. For about a month the graft stays attached and contracts but remains malleable to shape. In the second surgical stage the graft is swung around and attached to form a new nose. The Thiersch-grafted surface lines the nostrils. For a few weeks rubber tubes are kept inserted in the nostrils. After several weeks the pedicle is freed and receives its own blood supply. It has no tendency to fall flat and the nostrils remain patent.

The Place of the Physiotherapist in Cardiac Surgery

T. Holmes Sellors, BRIT. J. PHYS. MED., 19:61-64, March 1956

(This article was reprinted from the November 1955 issue of *Physiotherapy*)

The principles of physical therapy in cardiac surgery are similar to those used in general thoracic work, subject to modifications due to the actual disease of the heart itself. These modifications depend on the type of disease that is being treated. It is clearly not advisable to overexercise or exert cyanosed and dyspneic patients. Also, the patient whose heart muscle has been weakened or damaged must be handled more carefully than those in whom the heart is completely healthy.

Preoperative training should start one or two weeks before surgery, particularly in the case of the bedridden patient. At this time patients should be encouraged to breathe with all parts of their lungs and to gain control over the individual sections of the thoracic cage, so that after surgery they can concentrate their attention on the side of sur-

gery. The act of coughing should be explained as well as the importance of coughing in spite of pain after surgery. Preoperative training is of little value to young children as they cannot be taught selective breathing or the importance of coughing.

Postoperatively, physical therapy may include gentle breathing exercises, good bed positioning, encouragement of coughing, and on occasions postural drainage. At all times the physical therapist must watch the general appearance and pulse rate of the patient. With cardiac cases the period of bed rest is prolonged to five or seven days. Exercises in bed should be encouraged to prevent peripheral thrombosis. As soon as the patient becomes ambulatory, breathing exercises are increased and the posture of the patient is checked continually. Walking is gradually increased to include stair climbing. The importance of posture and persistence with exercises should be impressed on every patient before discharge.

Some of the more common heart operations are discussed in relation to physical therapy. Some excellent illustrations are included which demonstrate the importance of posture and various breathing patterns.

The Problem of Amyotonia Congenita

Charles Binney, TEXAS STATE J. MED., 52: 12, January 1956

The purpose of this article was to consider the common causes of muscular weakness in infants and children along with some of the differentiating factors in their diagnosis.

The clinical and pathologic similarities and differences between amyotonia congenita and progressive muscular atrophy have led to much controversy.

In amyotonia congenita there is marked weakness at birth. It is symmetrical, most pronounced in the proximal muscle groups, and more marked in the lower extemities. The muscles of the neck and trunk suffer early, and those of the hands and feet rarely, if at all. Response to electrical stimulation, both galvanic and faradic, is feeble to absent. The limbs are soft but retain a normal contour. Mentality is normal. There are no pathologic reflexes, the deep tendon reflexes are absent, and there is no interference with sensation. The body position of such children is dictated by gravity and the passive mobility of the joints. The child is not able to stand, walk, or even sit without support. The disease is progressive.

In progressive muscular atrophy, the first symptoms develop toward the end of the first year in a child who has been normal up to that time and who retains his mental integrity. There is a rapidly progressive weakness of the legs and trunk. The weakness is symmetrical and greater in the lower part of the body. The weakness extends to the shoulders, neck, and eventually the arms. Fibrillation and progressive wasting appear and may also be seen in the tongue and palate. The deep tendon reflexes disappear, sensation remains intact, and no pathologic reflexes appear. Response to electrical stimulation is feeble to absent. Progressive weakness of the intercostal musculature predisposes to respiratory tract infection leading to death usually before the third year. In the adult this would be the clinical picture of amyotrophic lateral sclerosis.

Other conditions which seem to be intermediate or combined forms of the two types of disease discussed are presented.

Pathologic findings in the nuclear amyotrophies are confined within the limits of the ventral horn and motor root and are almost purely cellular. In amyotonia congenita and arthrogryposis multiplex congenita the evidence points to a failure of neuronal development, whereas the emphasis is on active progressive destruction in progressive spinal atrophy. There is evidence, however, of both reactions in all nuclear amyotrophies.

The etiology remains unknown.

Treatment is symptomatic.

Silicone Barrier Cream in Prevention of Bedsores

F. J. A. Bateman, BRIT. M. J., No. 4966: 554-555, March 10, 1956

The prevention of bedsores in bed ridden patients is a problem which demands more time and attention from the hospital nursing staff than perhaps any other treatment. In the cases where geriatrics and the chronically ill are confined to bed for prolonged periods of time and, in addition, are incontinent of urine and feces, the nurse may spend most of her duty hours in a succession of "back rounds."

The procedure of prevention is usually one which includes washing of pressure areas with soap and water, drying carefully, rubbing with alcohol or other preparations to toughen the skin, dusting with powder to absorb moisture, and frequent changes of position. In the St. Mary's Hospital, this usual routine was carried out 5 times daily, but bedsores still occurred. It was believed that the rubbing with alcohol damaged the devitalized atrophic skin of the aged, and that the powder tended to cake in skin creases causing irritation. Drugs were used to overcome the disorientation of the aged, but the rubbing and maceration with urine and body fluids were still large factors in the creation of bedsores.

A new method of treatment with silicone barrier cream was tried as follows: (1) The position of the patient was changed as frequently as possible. (2) The skin was washed with soap and water as infrequently as possible. (3) Pressure areas were washed with warm water and dried carefully only twice a week, or whenever they became fouled. (4) Silicone vasogen was spread thinly and evenly on pressure areas and around established bedsores twice daily for a week then once daily. (5) All patients received tolazoline and vitamin C.

Since the introduction of this routine, the incidence of fresh bedsores has been lower than before. Another important advantage is the saving of time. With this new method, an average of ten minutes nursing time per patient per day can be saved. The cost of treatment is low.

The Anatomy of Lumbosacral Posterior Rami and Meningeal Branches of Spinal Nerves (Sinu-Vertebral Nerves)

H. E. Pedersen, C. F. Blunck and E. Gardner, J. BONE & JOINT SURG., 38-A: 377-391, April 1956

Since the establishment of disease of the intervertebral disc as a major cause of low-back pain and sciatica, there has been much interest in the mechanism of pain production. Previous reports have indicated that the lumbosacral pain and muscle spasm are due to the stimulation of nerve endings in the posterior longitudinal ligament or annulus fibrosis, or both. Other vertebral structures and tissues have also been suspect but published reports on the nerve

supply of these structures have been incomplete. The present study was undertaken to determine the distribution of the lumbosacral posterior rami and the sinu-vertebral nerves. The effect of electrical and mechanical stimulation upon the structures supplied by these nerves was also determined.

Luschka was the first to describe in any detail a recurrent branch of the spinal nerves which re-entered the spinal canal and supplied bone and blood vessels. He named these the sinu-vertebral nerves. He further described the connection of these nerves with the sympathetic system.

In this study, the distribution of the lumbosacral posterior rami and the sinu-vertebral branches of spinal nerves was determined by dissection of newborn and adult cadavers and by a detailed study of serial sections of human fetuses. In addition, blood pressure and respiration were recorded and electromyograms were made in decerebrate cats during electrical and mechanical stimulation of the low-back structures.

The posterior rami, in addition to their cutaneous and muscular distribution, give sensory fibers to fascia, ligaments, periosteum, and intervertebral joints. Adjacent divisions overlap in their area of supply. Interspinous ligaments are supplied mainly by branches from the next cranial level. Sinu-vertebral nerves supply posterior longitudinal ligament, dura mater, periosteum, and blood vessels, show intersegmental anastomoses and contain sensory fibers.

Painful stimulation of joints and ligaments of the lumbosacral region in cats produces reflex spasm of dorsal and hamstring muscles, as well as nonspecific changes in respiration and blood pressure.

It was suggested that clinically a painful stimulus to any deep structure in this region is poorly localized and can give rise to a common symptom complex which includes both low-back and leg pain.

Fracture of the Odontoid Process

Edwin W. Amyes and Frank M. Anderson, ARCH. SURG., 72: 377-393, March 1956

The records of 393 patients with cervical spine fractures and dislocations were reviewed. Of this number, 53 plus 10 additional patients included in the study had fractures of the odontoid process. Thirty-four of the group also had anterior or posterior dislocation of the odontoid fragment and the atlas.

The patients complained of severe pain in the neck or suboccipital region soon after their accidents. There was usually evidence of nuchal rigidity and edema. Definite diagnosis of odontoid fracture was confirmed by x ray. Neurological involvement, noted in 11 cases, varied from occipital hypalgesia to fatal paralysis.

Treatment consisted of bed rest for about one month following the accident and immobilization until good union was obtained. Immobilization with Crutchfield tongs and traction was preferred, but in a few cases a plaster jacket or Schanz collar was employed. A steel reinforced leather collar was recommended after traction. All but 3 fractures healed after 4 to 9 months of treatment. The 3 failures were the result of inadequate or improper treatment and operative fusion was indicated. Five patients died: two from spinal cord compression, two of associated injuries and one of meningitis.

Odontoid fractures are not uncommon after serious injuries. Adequate emergency treatment is imperative consisting of immobilization and measures to avoid complications. The dislocation may cause complications such as pressure on the spinal cord, vertebral artery or glossopharyngeal, palatal or chorda tympani nerves.

Inadequate respiration may necessitate a tracheotomy or care in a respirator.

The Physiotherapist and Prolonged Unconsciousness

P. S. London, BRIT. J. PHYS. MED., 19: 49-54, March 1956

The main task of the physical therapist in the care of the unconscious patient is to insure as far as possible that those patients who survive shall do so without preventable disorders, principally of the locomotor system. The author feels that it is permissible in these cases for the scope of physical therapy to trespass some of the adjacent fields, particularly that of standard nursing. Therefore, the treatment covered in this article is physical therapy in a broad sense.

The problems which arise out of a prolonged state of unconsciousness are considered under three headings; (1) those which result from the causes of the unconscious state, (2) those which result from the existence of the unconscious state, and (3) those which result from associated injuries and diseases. The specific needs for physical treatment are the maintenance of dry lungs, the prevention of stiffness and contracture of joints and muscles, and the avoidance of stagnation of urine with its consequent risk of the formation of decubitus calculi. Frequent turning of the patient and proper positioning are discussed. The use of tongue forceps and of a sucker are described. The need for bronchial catheterization, tracheotomy, and stimulation of respiration are included.

The prevention of stiffness and contracture are considered under three categories; (1) where the tone of the muscle is normal or decreased due to cerebral damage, (2) where the tone is increased, and (3) where paralysis results from damage to the peripheral nerves. In the first group, passive movement and the application of splints are the main treatment. Elevation, massage, and electrical stimulation are mentioned in cases of swelling. In milder cases of spasticity passive movements may suffice, but when there is marked spasticity, it is recommended that a spastic limb be immobilized in a functional position before adaptive shortening has occurred. This is to prevent a muscle tear and the consequent ossification of the hematoma.

The treatment of bed sores is discussed in detail. Many associated injuries are mentioned which have little or no need of physical therapy. In contrast to these conditions, there is the group which has a special need for physical therapy—damage to the peripheral nervous system. It is important to realize that this can occur along with central nervous system damage.

Rheumatic Fever Pneumonitis: A Clinical and Pathologic Study of 35 Cases

Mischa J. Lustok and Joseph F. Kuzma, ANN. INT. MED., 44: 337-357, February 1956

In this survey and in other studies there have been reported definite pulmonary changes which are associated with acute rheumatic fever.

The clinical history and autopsy

material of 35 patients who died in an active phase of rheumatic fever were reviewed. There were 17 males and 18 females ranging from 1 to 40 years of age. About half of the patients had died during their first attack of rheumatic fever and the remainder had had several attacks. Severe symptoms suggestive of pneumonitis occurred early during the terminal illness. Respiratory distress, cough, chest pain, cyanosis and hemoptysis were prominent.

In all of the cases the diagnosis of rheumatic pneumonitis was made at the autopsy examination. Rarely can a definite clinical diagnosis be made; it was suspected on two occasions of this series. The presence of unusually severe respiratory distress, not associated with congestive heart failure and nonresponsive to supportive management, should arouse the suspicion of rheumatic pneumonitis.

No suggestion as to an effective clinical management can be derived from this study. It is hoped that the antemortem recognition of pneumonitis with rheumatic fever is the basic prerequisite for evaluation of successful therapy.

The Biophysical Basis of Physical Medicine

Herman P. Schwan, J. A. M. A., 160: 191-197, Jan. 21, 1956

Physical medicine includes the use of physical forms of energy for therapeutic and diagnostic purposes in medicine. This paper evaluates present knowledge of diathermy, referring to heat development in the tissue beneath the skin and subcutaneous fatty layers by means of conversion of physical energy into heat. Ideal deep heating cannot be effectively performed by surface heating because the subcutaneous fatty layer is a poor heat conductor.

The thermal aspects of various forms of diathermy are evaluated according to biophysical considerations. Three different technics for deep heating include ultra-short-wave, microwave, and ultrasound. Ultra-short-wave and microwave utilize electric energy, while ultrasonic energy is in the form of mechanical vibrations. Ultra-short-wave therapy provides deep heating only to a moderate extent so that this discussion is confined to microwave and ultrasonic therapy.

Three factors are evaluated: (1) depth of penetration, (2) extent to which the energy passes through subcutaneous fatty layers without major energy loss and (3) determination of effective and safe dosages.

With both types of energy, depth of penetration decreases with increasing frequency; and with both, penetration is greater in fatty tissues with low water content than in deep body tissues with high water content. Ultrasonic energy at about 1 megacycle penetrates to about two inches while the presently used microwave at 2500 megacycles does not penetrate beneath 1 cm. In cases of bone structure, however, microwave is preferable for deep heating.

Concerning the energy loss before reaching deeper tissues, the efficiency decreases with increase in frequency of the energy. Therefore, ultrasound with its lower frequency is more effective.

In regard to determinations of dosage, the amount of energy delivered to the tissues can be read from the ultrasonic generator, provided it is properly applied. With microwave equipment, there is a complicated relationship between measured and biologically effective dosage which makes it difficult to determine clinical dosages. Alteration of the frequency of microwave would do away with some of its disadvantages. A disadvantage of sonic therapy is the limited size of cross section of the radiation field. In addition, the difference between the minimal dosage required for beneficial effect and the maximal dosage where damage occurs is small. Therefore, the application of microwave energy in high dosages is a safer procedure.

Peripheral Neuropathy Caused by Arsenical Intoxication

A. Heyman, J. B. Pfeiffer, R. W. Willett, and H. M. Taylor, NEW ENGLAND J. MED., 254: 401-409, March 1, 1956

Lesions of the peripheral nerves caused by arsenical intoxication were a frequent occurrence early in the present century. In recent years, exposure to arsenic has been greatly reduced, and arsenical intoxication is no longer considered a common cause of peripheral neuropathy. However, 41 cases of acute and chronic arsenical poisoning with peripheral neuropathy have been seen in Duke University Hospital and Durham Veterans Administration Hospital during the past fifteen years. This suggests that arsenical intoxication may be a more frequent cause of neuropathy, particularly in the rural areas, than is generally realized. This paper analyzes these 41 cases, emphasizing the clinical and laboratory diagnosis and giving special attention to the effects of BAL therapy.

The clinical features in acute poisoning include nausea, vomiting, and diarrhea which occur suddenly. In a few days or weeks hyperkeratotic skin lesions usually develop along with evidence of peripheral neuropathy and changes in fingernails. In patients with chronic exposure, acute gastro-intestinal symptoms may be absent, and the first signs are those of nervous system involvement or nonspecific manifestations such as weakness, prostration, muscular aching and personality changes. Each of these features is described in detail. Under neurologic manifestations, it is stated that the appearance of severe symmetrical muscular weakness of the extremities was an outstanding feature. This was predominantly distal but sometimes involved the more proximal muscles and rarely the shoulder and pelvic girdles. Atrophy of the muscles of the legs below the knees and of the small muscles of the hand developed rapidly. Fasciculations were observed in a few cases. Sensory examination revealed a decrease in touch, pain, and temperature sensations in the hands, feet, and lower legs in a symmetrical "stocking glove" distribution.

This paper also includes dicussions on the laboratory findings, differential diagnosis, therapy, prognosis, and the histologic changes in peripheral nerves and visceral organs. It was found that BAL administered seven or more days after arsenical exposure has little effect on the subsequent course of the neuropathy.

Our Abstractors for July

Abstracts in this issue were prepared with the assistance of—

Elizabeth Jackson
Margot Trimble

We appreciate their cooperation in making this material available.

Book Reviews . . . . .

Teaching Physiology and Anatomy in Nursing. Signposts for Science Teachers. *By Hessell H. Flitter, R.N., M.S., Assistant Professor and Consultant on Curriculum and Evaluation, School of Nursing, University of Pennsylvania; and Harold R. Rowe, R.N., M.S., Assistant Professor and Advisor to the Hospital Contract Program (Central Science Teaching Service), School of Nursing, University of Pennsylvania. Cloth; price $2.00. Pp. 56. J. B. Lippincott Co., Philadelphia, 1955.*

The aim of the authors has been to present suggestions and ideas for the beginning teachers of anatomy and physiology in schools of nursing. They feel that the beginning teacher needs help in selecting the best approach, the best sequence of units, the best technics, and the best laboratory material to use.

A brief discussion of the current approaches to teaching anatomy and physiology is given. These approaches include the content-centered approach, correlation, integration, and the patient-centered approach. Most emphasis has been given to the latter approach in which a unit on "The Needs of the Patient Requiring Early Ambulation" has been worked out in detail. With this patient as the motivation point, anatomy and physiology regarding posture, body movement, blood, and the abdominal cavity are outlined. Laboratory experiences are suggested for each topic.

Each of the six units is discussed briefly in order to show topics which might be included and to point out the sequence of units. The discussion has purposely been limited to make it practical and when the authors felt that a more comprehensive coverage was necessary, they referred the reader to Esther M. Greisheimer's *Physiology and Anatomy.*

Suggestions regarding the time allotted to this course were made. The distribution of time was correlated with the suggested course outline, including lecture and laboratory, worked out on the basis of 108 hours as the total.

This text gives only a brief discussion of any topic, because it is designed as a guide for organizing a course. Since the best teaching approach varies with individuals, the information has purposely been presented in a form applicable to all basic nursing sciences. The reader is referred to Volume I of the *Bibliographies on Nursing* prepared by the National League of Nursing Education, for comprehensive source material on anatomy and physiology. Because of the limited scope, the text will be of greatest value to the teacher just beginning to teach in a nursing education curriculum.

Growth at Adolescence. *By J. M. Tanner, M.D., Ph.D., D.P.M. Senior Lecturer in Physiology, St. Thomas' Hospital Medical School, University of London. Cloth; price $4.75. Pp. 212; illus. Charles C Thomas, Springfield, Illinois, 1955.*

We are in Tanner's debt. He has done a much needed job and has done it well. The whole field of circum-pubertal growth and development is covered, basically the age-period 13-15 years, which he defines as the "adolescent growth spurt." Obviously, this age period is focal, but the years before and the years after are dealt with within the framework of time-linked variability.

In all the data Tanner differentiates between distance curves of growth, usually based on cross-sectional data, and velocity or rate curves, derivable only from the incremental data of longitudinal or serial growth studies. The latter curves and the latter method of gathering data are really the only valid, meaningful ones. To physical therapists who work mainly with adults a knowledge of growth processes and mechanisms takes on potent meaning as Tanner concludes, "The difference in size between adult men and women is to a large extent the result of this difference in adolescent spurt [boys with peak velocity at 14-15, girls at 12-13]; prior to it, boys and girls are practically the same height" (p.3).

In a book as detailed as this—it is a summary and compend of present knowledge on the subject—it is difficult to do other than indicate certain basic principles put forward by the author. I would first mention Tanner's emphasis upon the *whole child.* "Every muscular and skeletal dimension of the body seems to take part in the adolescent spurt" (p.8). "The point (is) that the adolescent spurt is a unity, comprising bodily growth, growth of the reproductive organs, and physiological changes, all occurring early or all occurring late. . . ." (p.57). "Evidently there is some general factor of bodily maturity throughout growth, creating a tendency for a child to be advanced or retarded as a whole, in the percentage attained of his eventual size, in his skeletal ossification, in his permanent dentition, doubtless in his physiological reactions, and also in his intelligence test scores, and perhaps other psychological responses" (p.62). It is of moment that Tanner accepts, to a degree, a mind-body growth continuum, though later he says, "Whether any adolescent spurt occurs in the growth of mental ability is not certainly known" (p. 139).

There is a constant and consistent emphasis upon the early-late dichotomy in growth as assessed by maturation (skeletal) age. He notes that "larger children are more skeletally advanced, irrespective of age" (p. 60); or again, ". . . . children with an early puberty are heavier" (p. 65); ". . . . boys and girls who (are) tall before puberty (begin) adolescence earlier than those who (are) short" (p. 70). Tanner finds that "curves of strength increase resemble very closely the curves for morphological and physiological characters" (p. 133), but there seems to be "a period of about a year when a boy, having completed his physical growth, does not have the strength of a young adult of the same body size and shape" (p. 135).

I find myself in complete agreement with Tanner when he tosses chronological age (calendric age) out the window. To judge a child's growth and development, his behavior, his intellectual progress, by such a standard is to disregard the childs own rhythm, own rate, own uniqueness. Tanner might well have quoted Thoreau: "If a man does not keep pace with his companions, perhaps it is because he hears a different drummer. Let him step to the music which he hears, however measured, or far away."

This review has not done justice to the wealth of detailed information on adolescent growth which Tanner has so successfully synthesized. In my opinion—and I have considered this carefully—this book is a *must* to any and all who work with the morpho-physiological variables of *Homo sapiens.*

Neuro-Vascular Hila of Limb Muscles. *By James Couper Brash, M.C., M.A., M.D., D.Sc., LL.D., F.R.C.S.Ed., F.R.S.E. Professor Emeritus of Anatomy, University of Edinburgh. Cloth; price $7.00. Pp. 100; 30 colored plates. E. & S. Livingstone Ltd., Edinburgh and London, and Williams & Wilkins Co., Baltimore, Md., 1955.*

This small atlas presents in 30 partly colored plates the areas of vascular and nervous supply to the large muscles of the human limbs.

The term Neuro-vascular Hila was first used by Frohse (1898) in reference to the human limb. Frohse stated that in many cases blood vessels and nerves have a common entrance into skeletal muscles, though, more often we must think of an area or pattern rather than a common point of entrance.

The atlas is the result of extensive laboratory studies made in cooperative planning under the leadership of the author at the Universities of Edinburgh, Glasgow, Aberdeen, and Leeds. Approximately 70 upper and lower extremities have been dissected for the purpose of this study. Observations and data were pooled and recorded. The illustrations were drawn from the dissected material and reduced in size on a common plan which is based on outlines taken from radiographs of living limbs. Thus, a scale was provided which allows one to read off the average level of origin of the motor nerve from the main trunk and its entrance into the muscle in relation to the bony landmarks selected in these series. Where marked deviations occurred from the apparent average—as was determined from the collected data—adjustments were made. Minor variations, however, have been retained to indicate the type of arrangement that may frequently be expected. The illustrations are simple and clear. The reader can readily provide labels if he so desires.

Each plate is provided with an explanatory text which includes a summary of the observations made on the dissected samples, as well as a selected summary of observations and recordings made in previous studies throughout the literature. Each muscle is accompanied by a table which gives the percentage figure of frequency with which the position as shown in the drawing may be expected to occur, and the percentage of variations in proximal and distal directions. In general, the drawings represent the most frequent and not the average level of occurrence. An additional table is given which shows also in percentage the frequency with which the main blood supply of the muscle was observed to enter with the main motor nerve. The frequency of a true neuro-vascular hilum varies greatly with different muscles.

The main purpose of these laboratory investigations was to assist the clinician in his diagnosis and treatment of the results of injuries affecting the nerve and blood supply of the extremities.

This atlas should be of much interest and value to both the physician and the physical therapist. Its form is designed to serve as a practical guide in the clinical situation but may be as useful as a supplementary reference book for the student of anatomy. It is to be warmly recommended to students and therapists.

The Pathogenesis of Poliomyelitis. A Monograph in American Lectures in Pediatrics. *By Harold K. Faber, M.D., Professor Emeritus of Pediatrics; Director of Poliomyelitis Research Department of Pediatrics, Stanford University School of Medicine; Formerly Pediatrician in Chief, Stanford University Hospitals, San Francisco; Medical Director Stanford Convalescent Home, Stanford. Edited by John A. Anderson, M.D., Professor and Head, Department of Pediatrics, School of Medicine, University of Minnesota. Cloth; price $5.00. Pp. 157; illus. Charles C Thomas, Springfield, Illinois, 1955.*

This monograph of the American Lecture series, beautifully printed, details the results of intensive poliomyelitis research by Dr. Faber and his associates at Stanford University.

It undertakes the broad purpose of clarifying the basic nature of the disease and to explain the modus operandi of poliomyelitic infection. The specific basic properties of the virus are described and detailed discussion is given on the entry of the virus into the body and how it is spread and excreted.

The currently popular view that poliomyelitis is primarily an intestinal extraneural infection is vigorously disputed and careful presentation is given to the controversy as to whether the virus is strickly neurotropic or more strictly neuronocytotropic with its primary host of living subject to be the nerve cell alone. The fundamental concepts and interpretations of poliomyelitis by Dr. Faber in no way conflict with the possibility of successful immunization, they merely define the ways in which it may be expected to operate and the very real limitations present.

This small volume is well written and well illustrated with a splendid bibliography. It would represent a worth while experience to any doctor, nurse, or therapist who seeks a basic understanding of this perplexing disease.

The Importance of Physiotherapy in the Treatment of Sick Children. *By J. M. Jewry-Harbert, M. C. S. P. Foreword by Dr. Wiltrid Sheldon, C.V.O., M.D., F.R.C.P. Cloth; price $2.50. Pp. 84; illus. Staples Press Ltd., London and John de Graff, Inc., New York, 1955.*

The publisher's note on the inside jacket of this book says that "it deals fully with physiotherapy for children both from the physical and psychological standpoint."

This is a rather misleading statement. Although the value of a textbook can never be judged by the number of its pages, it would seem quite obvious that a subject as wide and general as expressed in this title could hardly be covered adequately on some 80 pages.

Therefore, the number of subjects discussed had to be limited; the result seems to be a somewhat superficial discussion of various children's diseases. Consequently, the book does not offer the material which a physical therapist, specializing in work with children might need in addition to her general knowledge. It seems strange that many disorders and conditions which are encountered so frequently on the wards and in the clinics of a children's hospital are not even mentioned; the omission of cerebral palsy is probably the most startling example. Although a few general breathing exercises are described one might have wished that more space be given to the treatment of asthma, a specialty in our field where our British colleagues are known to do such excellent work. In the chapter on "Posture" the author, and rightly so, stresses the importance of all-round development of the young

child as a prevention of later defects and deformities; however, such postural problems as lordosis, kyphosis, and scoliosis are not even mentioned. Other frequent diseases and disabilities are put aside with a few lines of explanation such as "I have nothing fresh to add to the recognized methods of treatment" (in regard to polio) or "the manipulations for the slight cases are so familiar that there is no need to repeat them here" (in regard to torticollis). While such modesty on the part of the author is appreciated, it would have been useful for those who want basic information on the subject if Mrs. Jewry-Harbert had at least summarized some of the general methods and principles of the treatment.

There are also many challenging and controversial statements which might be difficult to substantiate. To mention only one: we find under spina bifida that "the prognosis for these cases is very bad . . . the only way in which we can help these cases is by improving the circulation of the legs."

On the credit side it must be mentioned that the book outlines the treatment of a few diseases which are only rarely referred to the physical therapy department in our country, e.g., fibrocystic pancreas, Hirschsprung's disease, pink disease, coeliac disease, scleroderma, and chorea. The lack of information in our existing textbooks on these subjects make even the incomplete description in this volume quite valuable.

It is also a valuable contribution that throughout the book the author has emphasized the importance of good relationship between the little patient and the physical therapist. In the chapters dealing with the psychological aspects of our work with the children there are many helpful suggestions for those who have little experience with young patients. Judging from the sincere and warm feeling which permeates this little volume, there can be little doubt that Mrs. Jewry-Harbert possesses the gift to see and deal with a child as a human being and friend rather than as an interesting case.

To sum up, the author calls this book the first and only one dealing with physical therapy in sick children. Now that she has made a start it is to be hoped that she or others will continue on that road and deal with the subject in that greater detail and thoroughness which is needed.

Guidance In Groups. A Resource Book for Teachers, Counselors and Administrators. *By Margaret E. Bennett, Psychologist, Pasadena City College. Supplemented by "A Human Relations Program" by Celia F. Johnson. Cloth; price $5.50. Pp. 411. McGraw-Hill Book Co., New York, 1955.*

The author, as stated in the preface, deals systematically and extensively with group approaches to all phases of guidance—personal, social, vocational, and educational—at various age levels from childhood to later maturity. The author emphasizes the purposes of group procedures in guidance of personnel services and considers their relationship with individual procedures such as counseling.

The book traces the sources of group guidance procedures in social work, medical and psychiatric practice, religious and secular education, and personnel work, with emphasis on implications of practices in these various fields for educational programs at all age levels. In helping each person within the group to understand himself and to achieve skill in making wise choices, realistic plans, and useful adjustments, it focuses on the aspects of emotional adjustment, mental hygiene, and human relations.

Research which deals with common problems in living at diverse ages is utilized (1) to indicate desirable emphases in group procedures at different levels; and (2) to suggest procedures for investigating common problems in any group. Implications of research findings in group dynamics, in learning processes, and in group therapy are brought to bear upon learning technics in group guidance and upon special procedures such as problem-solving technics, role playing, the case method, multiple counseling and group therapy; these are described and illustrated. Illustrations of classroom technics also are used throughout the book, and examples of forms and exercises are included in the Appendix with an illustrative unit on human relations and a bibliography of visual aids.

The reviews here published have been prepared by competent authorities and do not represent the opinions of the American Physical Therapy Association.

Our Book Reviewers for July

Susanne Hirt, Technical Director, School of Physical Therapy, Medical College of Virginia, Richmond.

Wilton M. Krogman, Ph.D., Professor of Physical Anthropology, Graduate School of Medicine, University of Pennsylvania; Director, Philadelphia Center for Research in Child Growth, Graduate School of Medicine.

Carl D. Martz, M.D., Assistant Professor, Orthopedic Surgery, Indiana University Medical Center, Indianapolis.

Roxie Morris, Associate Professor, Physical Therapy Department, University of Southern California, Los Angeles.

Agnes P. Snyder, Lt. Col. AMSC, Chief, Physical Therapy Branch, Office of the Surgeon, Department of the Army, Washington, D. C.

Elizabeth Zausmer, Assistant Technical Director, Physical Therapy, Children's Medical Center; Instructor, Simmons College, Boston.

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What's New . . . . . .

140. Respiratory Bed

Tomac Respiratory Bed safely weans polio patient from iron lung with quiet, oscillating movement from 12 to 30 excursions per minute, the manufacturer states. Four-Section spring offers wide range of positions for maximum patient comfort.

Tip-proof bed stands 31 inches from floor for easy nursing service. Operator can readjust degree of tilt and speed of movment while bed is in motion. Tilt is adjustable from 30 degrees head-end down position to 40 degrees foot-end position. Spring frame is rubber mounted to reduce vibration. Distributor, American Hospital Supply Corp.

141. Disposable Slipper

Sanitary footwear can be worn in examination rooms, manufacturer claims. Slipper, made of water-resistant white chipboard, one-piece construction, has straps that fold around the foot. Firm fit to any size foot is obtainable with slotted straps. Guest-Slipper.

For more information on items write to The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.

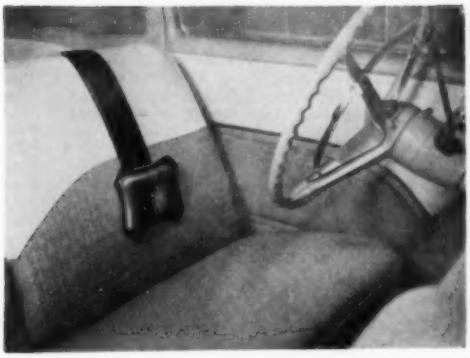
New items which may be of interest to physical therapists will be mentioned in these pages each month. The accompanying explanations are made by the manufacturers and have not been investigated by the *Physical Therapy Review.*

142. Utility Walker

Utility Walker, according to the manufacturer, can be used as a lunch table or a work chair as well as for support while walking. The walker weighs 15 lbs., is constructed with an all steel frame, has a plywood seat, rubberized non-marking wheels, double ball-bearing casters, and 5 in. height control. A and K Manufacturing Co.

What's New . . . . . .

144. Back Support



Driverest, according to the manufacturer, is a scientifically designed back support that promotes comfort while driving, riding or sitting. Made of Vinyl-foam, the support cannot slip, slide or creep and is finely contoured. Driverest is available in several harmonizing colors. Driverest Company.

145. Human Skeletons

New line of reproductions of human skeletons, skulls, and other osteological specimens in polyester resin. The durable resin will not fade, craze, or turn brittle, according to the manufacturer. Molds for the plastic specimens are made from normal human specimens. Plastic reproductions will do much to alleviate occasional shortages of natural bone material. Resin does not deteriorate with age. Plastic may be cleaned with mild soap solution. Adult male skeleton with or without painted muscle attachments; adults' and children's skulls; mandibles; vertebral columns; male pelvis; and reproduction of a herniated disc are now available. Clay-Adams, Inc.

146. Airug

Airug provides cushioned comfort for those who stand at work. The microcellular construction has all the advantages of sponge but does not absorb moisture. The surface is easily cleaned, has safety grip back design, is available in 24″ x 36″ and 36″ x 60″ sizes, and two colors, brown and gray. Bearfoot Airway Corporation.

147. Training Course in Effective Speaking

Funk and Wagnalls Training Course in Effective Speaking includes 7 double-faced non-breakable records containing 57 speaking technique demonstrations, cut by a professional speaker; an instruction manual; and a Funk and Wagnalls New Desk Standard Dictionary. According to the publishers the course develops the ability to speak more clearly, convincingly, and dramatically on every occasion — business and social life, and public speaking. Funk and Wagnalls Company.

Classified WANT-ADS

QUALIFIED PHYSICAL THERAPISTS for immediate placement in established Crippled Children's Hospital and rapidly growing comprehensive Rehabilitation Center treating wide variety of patients. Well equipped therapy department with pools and adequate space. Employee benefits. Maintenance if desired. Write: Jack E. Pearson, Morris Memorial Hospital and Rehabilitation Center, Milton, West Virginia.

IOWA'S LARGEST PRIVATE HOSPITAL now planning expansion of facilities needs qualified physical therapist. Institution includes 100-bed Raymond Blank Memorial Hospital for Children. Post-polio cases, in- and outpatient work. Competent professional staff and assistants, excellent working relationships. Apply Anthony D. Damiani, Personnel Director, Iowa Methodist Hospital, Des Moines, Iowa.

NEEDED IMMEDIATELY Physical therapist to organize a Home Service Program. Outpatient Physical Medicine Rehabilitation Center in University and capitol city. Excellent personnel policies. Write: Gloria J. Fitzpatrick, R.P.T., Director, Ingham County Curative Workshop, 615 N. Capitol, Lansing, Michigan.

PHYSICAL THERAPIST: WANTED for active, well-equipped department in 115-bed hospital with expansion program underway. Pleasant surroundings in north suburb of Chicago. Modern housing. Recreational facilities and cultural activities available. Good salary, 40-hour week, varied cases treated. Apply to Personnel Director, Highland Park Hospital, 718 Glenview Avenue, Highland Park, Illinois.

POSITIONS AVAILABLE for qualified physical therapists for active rehabilitation department in modern 500-bed, chronic disease hospital. Salary open. Four weeks' vacation. Sick benefits. Lunches. Apply Superintendent, St. Barnabas Hospital, New York 57, N. Y.

PHYSICAL THERAPISTS, registered in California, for one year's training in the Kenny Treatment of poliomyelitis and specialized care of neuromuscular disorders and rehabilitation problems. Salary during period of instruction will be $350. per month, generous increases after one year. Specialized training under supervision of Board certified physiatrists and orthopedic surgeons. Fully accredited 137-bed hospital with respirator unit. Write to: Etta Siquido, R.N., Secretary Professional Services, Sister Kenny Memorial Hospital and Rehabilitation Center, 4039 N. Gilman Road, El Monte, Calif.

A STAFF PHYSICAL THERAPIST for rapidly expanding rehabilitation center, either experienced or inexperienced therapist acceptable. Excellent working conditions, 37½-hour work week, good pay, good personnel policies, good medical supervision. Crossroads Rehabilitation Center moved into new building May 1. Wonderful opportunity for staff growth and promotion. Contact Roy E. Patton, Executive Director, 3001 North Jersey Street, Indianapolis, Indiana.

QUALIFIED PHYSICAL THERAPIST needed for supervisor of department in children's orthopedic hospital. Salary $325 per month plus full maintenance, for a single woman, or $400 without maintenance, 15 days' vacation, 15 days' sick leave, 40-hour work week. Contact Leo P. Schwartz, Administrator, Carrie Tingley Hospital, Truth or Consequences, New Mexico.

PHYSICAL THERAPIST: In Hospital-School for rehabilitation of children with orthopedic handicaps. Complete interesting program. Good salary, merit increases. Annual paid vacation, sick leave, excellent retirement plan. Write Vera E. Dennis, Director of Physical Therapy, Illinois Children's Hospital-School, 2551 N. Clark, Chicago 14, Ill.

PHYSICAL THERAPIST: for active well equipped department in large teaching center affiliated with Washington University. Good salary with regular increases and paid vacation. Write to Mrs. Ruth Benz, Dept. of Physical Therapy, 600 South Kingshighway, St. Louis 10, Missouri.

WANTED: QUALIFIED physical therapist in an 80-bed general hospital with an outpatient department. Salary open, 40-hour week, paid vacation, sick leave, lunch provided, living in or out. Attractive location in university town. Hospital expansion in view. Write Bertha Hochuli, Superintendent, Boone County Hospital, Columbia, Missouri.

WORK IN TORRANCE, CALIFORNIA, near Los Angeles and beach resorts. Several openings for physical therapists at Los Angeles County Harbor General Hospital. Must be graduate of approved school. Good salary, civil service benefits. Promotional opportunities. Write: Personnel Director, Harbor General Hospital, 1124 W. Carson Street, Torrance, California.

PHYSICAL THERAPIST for 190-bed hospital to assist present therapist. Volume of work increasing. Department well equipped. Hospital in city of 40,000 population located on St. Clair River and lower Lake Huron. Write: L. R. Faust, Administrator, Port Huron Hospital, Port Huron, Michigan.

PHYSICAL THERAPIST wanted for doctor's office, new department. Located in community of fifty thousand. Good salary. Apply to Drs. Lebold and Anderson, 1489 State St., Salem, Oregon.

WORK IN LOS ANGELES, Calif. Several openings for physical therapists at Los Angeles County General Hospital and other hospitals in Los Angeles County Hospital system, including Rancho Los Amigos. Must be graduate of approved school. Good salary, Civil Service benefits. Opportunities for promotion in a rapidly growing area. Write: Personnel Director, Los Angeles County General Hospital, 1200 N. State Street, Los Angeles 33, California.

Classified WANT-ADS

REHABILITATION SERVICES, INC., 200 Court Street, Binghamton, New York, will have staff physical therapist position available September 3, 1956. Modern facilities, outpatient service, established personnel policies, with salary dependent on qualifications. Inquire: Ward A. Merrell, Administrator, Rehabilitation Services, Inc.

PHYSICAL THERAPIST: STAFF position. Opportunity for varied experience; 650-bed general hospital, near center of cultural and educational activities. Vacation, sick leave, and social security benefits. Apply Personnel Director, Harper Hospital, Detroit, Michigan.

WANTED: A qualified physical therapist, male or female, for well equipped department in a modern 275-bed general hospital with outpatient service; 40-hours per week; paid vacation, sick leave, 6 holidays; salary open. Apply Robert M. Murphy, Administrator, Lima Memorial Hospital, Linden and Mobel Streets, Lima, Ohio.

PHYSICAL THERAPIST NEEDED for poliomyelitis respiratory center at the new Research and Educational Hospitals of the University of Illinois. Excellent opportunity to function as a member of a progressive rehabilitation team. Therapist will also take part in the educational program of the university if qualified. Salary commensurate with experience. Housing available. Write: June Schroeder, Chief Physical Therapist, Dept. of Physical Medicine & Rehabilitation, University of Illinois, 1853 West Polk Street, Chicago 12, Illinois.

WOMAN PHYSICAL THERAPIST to complete department of 5. Begin at $358. Modern equipment & treatment areas. 4,500-bed mental hospital near San Bernardino, Calif. Fine sports area; 40-hour wk., 3 wks. pd. vacation, 11 pd. holidays, 12 days sick leave, excellent retirement plan. For details write J. H. Turner, Personnel Officer, Patton Hospital, Patton, Calif.

ASSISTANT CHIEF PHYSICAL THERAPIST to supervise technical activities of large qualified staff; extensive variety of clinic and hospital cases; opportunity for research; 4 weeks' annual vacation, disability leave, retirement system; knowledge of electromyography desirable but not necessary; 5-day week; annual leave with pay, disability leave, retirement system; salary commensurate with experience and/or specialized training. Apply Office of Non-Academic Personnel, University of Illinois, Research & Educational Hospitals or Dept. of Phys. Med. & Rehab., 840 S. Wood St., Chicago 12, Ill.

PHYSICAL THERAPIST experienced to operate new department in general 165-bed hospital on shore of Lake Michigan in a city of 55,000 people, midway between Chicago and Milwaukee. This is an ideal opportunity because 4 out of 5 hospitals within a radius of 30 miles have fine ethical departments. Salary and working conditions excellent. Write to Sr. Amata, St. Catherine's Hospital, Kenosha, Wis.

WANTED: QUALIFIED physical therapist experienced in REHABILITATION technics to treat and instruct patients in arthritis clinics of metropolitan hospitals with some home follow-ups. Must drive car. Excellent opportunity. Apply Arthritis & Rheumatism Foundation, John Bartram Hotel, Philadelphia 7, Pa.

WANTED: PHYSICAL THERAPIST (female) for full or part-time work in orthopedic surgeon's office. Write to Daniel B. Eck, 144 South Harrison Street, East Orange, N. J.

CALIFORNIA MEDICAL CLINIC needs QUALIFIED PHYSICAL THERAPIST for regular clinic duty—own department—40 hr. week, Social Security, sick leave holiday benefits. Good salary, pleasant working conditions. Contact Vivian Crane, Manager, San Luis Medical Clinic, 990 Pacific Street, San Luis Obispo, California.

WANTED IMMEDIATELY: TWO qualified physical therapists for staff positions in 565-bed general hospital. Good salary with regular increases, vacation holidays and sick leave; 40-hour week; laundry and meals provided. Write: Mr. Doff Griffith, Physical Therapy Dept., Akron City Hospital, Akron, Ohio.

PHYSICAL THERAPIST for general outpatient program at Junior Service League Orthopedic Center, 1219 Dunn Avenue, Daytona Beach, Florida. Excellent personnel practices. Contact Christine Haukland, R.P.T.

Classified WANT-ADS

RATES

The rate per insertion is $1.00 per line. Typewrite your advertisement carefully and count 50 characters and spaces per line.

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Closing date for copy and cancellations is two months preceding publication date.

Institutions or physical therapists who do not wish their identity known may arrange for Blind Ad Code No. All such want-ads must include the following which will be counted as 2 lines:

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